

*March • 1957*

**M**etal  
**P**roducts  
**M**anufacturing

*including* **finish** \_\_\_\_\_

SERVING THE  
*Appliance* AND  
FABRICATED METAL PRODUCTS INDUSTRY

FROM RAW METAL TO FINISHED PRODUCT

# WHAT YOU NEED...WHEN YOU NEED IT

FOR *Colorful* PORCELAIN ENAMEL



*Colors*

Color Oxides  
Smelter Color Compounds  
Screening Colors  
Graining Colors  
High Temperature Enamels

*Supplies*

Screening Oils  
Lining Blocks—Porcelain, High Density,  
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French Flint Pebbles  
Rounded Flint Grinding Cubes  
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Porcelain Jar Mills—Laboratory and  
Production  
Paste Grinding Mills  
Spray Equipment  
Silk Screening Cloth  
Stainless Steel Wire Cloth

*Chemicals*

Aluminum Hydrate	Lithium Compounds
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Antimony Oxide	Magnesium Carbonate
Antimony, Black Needle	Manganese Dioxide
Barium Carbonate	Molybdenum Compounds
Bentonite	Nickel Oxide, Grey
Cadmium Carbonate	Nickel Oxide, Black
Cadmium Sulphide	Nickel Sulphate
Chromium Oxide	Opax
Cobalt Carbonate	Potassium Carbonate
Cobalt Compounds	Potassium Nitrate
Cobalt Nickel Compounds	Potassium Silico Fluoride
Cobalt Oxide	Sodium Antimonate
Cobalt Sulphate	Sodium Fluoride
Copper Carbonate	Sodium Nitrate
Copper Oxide	Sodium Nitrite
Copper Sulphate	Sodium Silicate
Cryolite	Sodium Silico Fluoride
Epsom Salts	Tin Oxide
Fluorspar	Titanium Dioxide
Gum Arabic	Urea Crystals
Gum Tragacanth	Zinc Oxide
Iron Oxide	Zirconium Silicate
Litharge	Zirconium Oxide



**CERAMIC COLOR & CHEMICAL MFG. CO.**  
**New Brighton, Pa.**





## Porcelain Enamel

### Fills Homemakers' demands for High Quality Products

In many households, washers and dryers have moved out of the basement and into the kitchen, recreation room, or other living areas. As a result, housewives want a finish on laundry equipment that's attractive and stays attractive. Nothing meets this requirement better than porcelain enamel.

Porcelain enamel resists damage from ordinary household usage—even the treatment it may get from children's toys. In addition, it won't fade or discolor with age. Soap and water are all that's needed to keep porcelain enamel surfaces sparkling clean. That's why today's homemakers consider this lifetime finish a welcome addition to their furnishings.

A porcelain enamel finish on your products gives you other sales advantages, too: It resists heat, thermal shock and food acids.

\* \* \*

If you do not have facilities for porcelain enameling, write us for the name of an experienced job enameler near

you. You'll find that he can help you work out problems of design and production. You'll find, too, that most job enamelers specify Armco Enameling Iron as the base metal for their product. They know that Armco quality is consistently high. That's how it earned its reputation as the "World's Standard Enameling Iron."

#### Armco Steel Corporation

777 Curtis Street, Middletown, Ohio

- ☐ Send us the name of an experienced job enameler.  
☐ Send us your catalog, "Armco Enameling Iron."

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Name \_\_\_\_\_

Company \_\_\_\_\_

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777 CURTIS STREET, MIDDLETOWN, OHIO

SHEFFIELD STEEL DIVISION • ARMCO DRAINAGE & METAL PRODUCTS, INC. • THE ARMCO INTERNATIONAL CORPORATION



## What's in a name?

What the Bard said about a rose doesn't hold today. For no matter what the goods, brands may differ greatly.

And as some things change, so do their names.

Take this magazine. Its widening scope of interest called for more than the name "finish". Now it is devoted to many more aspects of fabricated metal products.

But how does Titanium Pigment Corporation fit here? After all, for the most part, we don't deal directly with metal fabricators.

Our job is to furnish to makers of finishes the ingredient that makes modern white and light-colored coatings possible—titanium dioxide.

Not only do we see to it that the titanium dioxide products bearing the name TITANOX® meet the exacting requirements of coatings for metal, but we also keep in step with progress in finishes.

Outstanding steps along the finish line of progress in TITANOX are: ease of dispersion in organic vehicles; reduction of after-yellowing of synthetic resin coatings; control of fading-chalking of tinted organic coatings; maximum opacity in porcelain enamels.

You who make things in metal can place confidence in the appeal and durability of those finishes that contain the titanium dioxide designated by the first name in titanium—TITANOX. Because TITANOX identifies a full line of titanium dioxide products, the maker of finishes can select from this line the best white pigmentation for any kind of coating from primers and finish coats involving any type of organic vehicle to porcelain enamels for aluminum or steel.

And we are always ready to work with producers of finishes in the best white pigmentation of their products. Titanium Pigment Corporation (subsidiary of National Lead Company), 111 Broadway, New York 6, N. Y.; Atlanta 5; Boston 6; Chicago 3; Cleveland 15; Houston 2; Los Angeles 22; Philadelphia 3; Pittsburgh 12; Portland 14, Ore.; San Francisco 7. In Canada: Canadian Titanium Pigments Limited, Montreal 2; Toronto 1; Vancouver 2.

4954

# MPM

(including finish)

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## METAL PRODUCTS MANUFACTURING

FROM RAW METAL TO FINISHED PRODUCT

A trade publication devoted to the interests of the metal products manufacturing industry with special editorial attention to home appliances. The editorial scope covers design, engineering, market and statistical information and technical and practical information on plant facilities and all phases of manufacturing "from raw metal to finished product." Free controlled circulation to top management, purchasing, engineering and key plant management and supervision in metal product manufacturing plants. To others, subscription price is \$8.00 per year, domestic. To all other countries \$10.00 per year (U.S. funds). Single copies, \$1.00.

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Mgr., Customer Service • DANA CHASE, JR.

Customer Service • JEANETTE P. SHOAF

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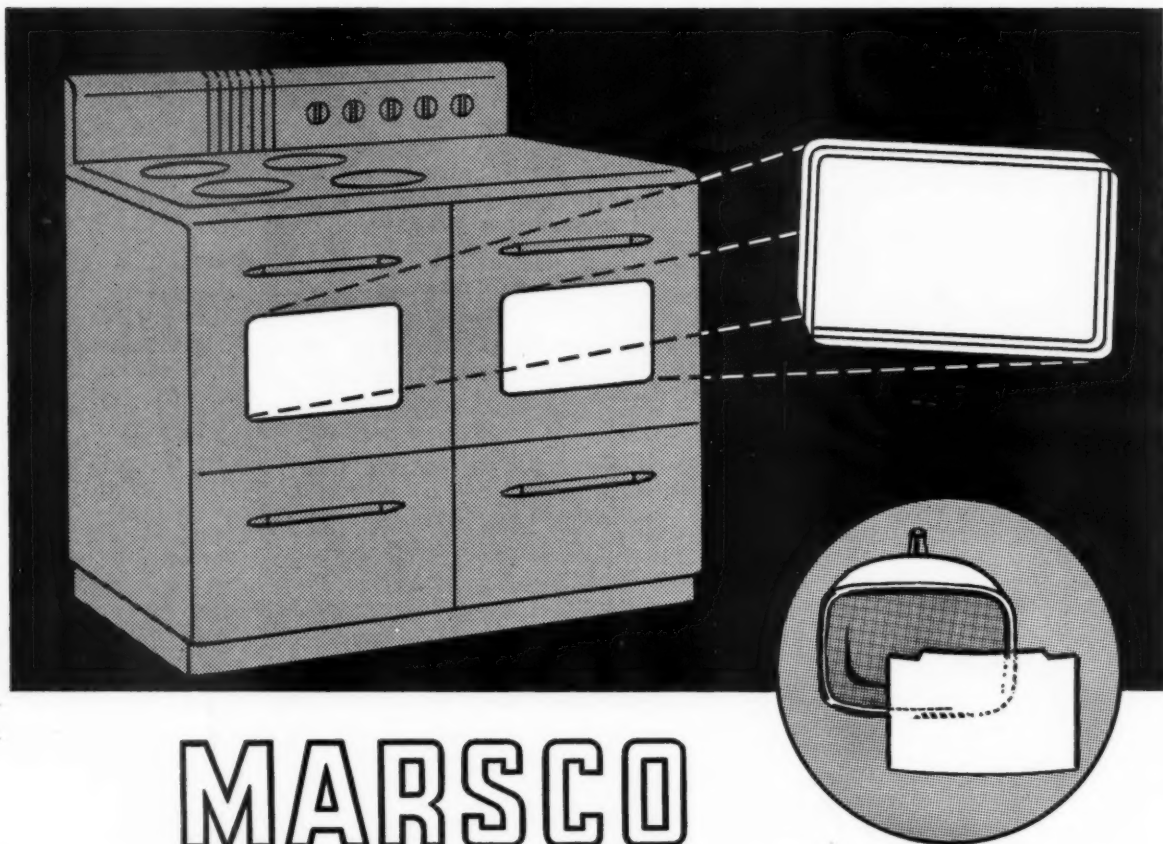
JAMES M. LEAKE

RALPH F. DISBEE

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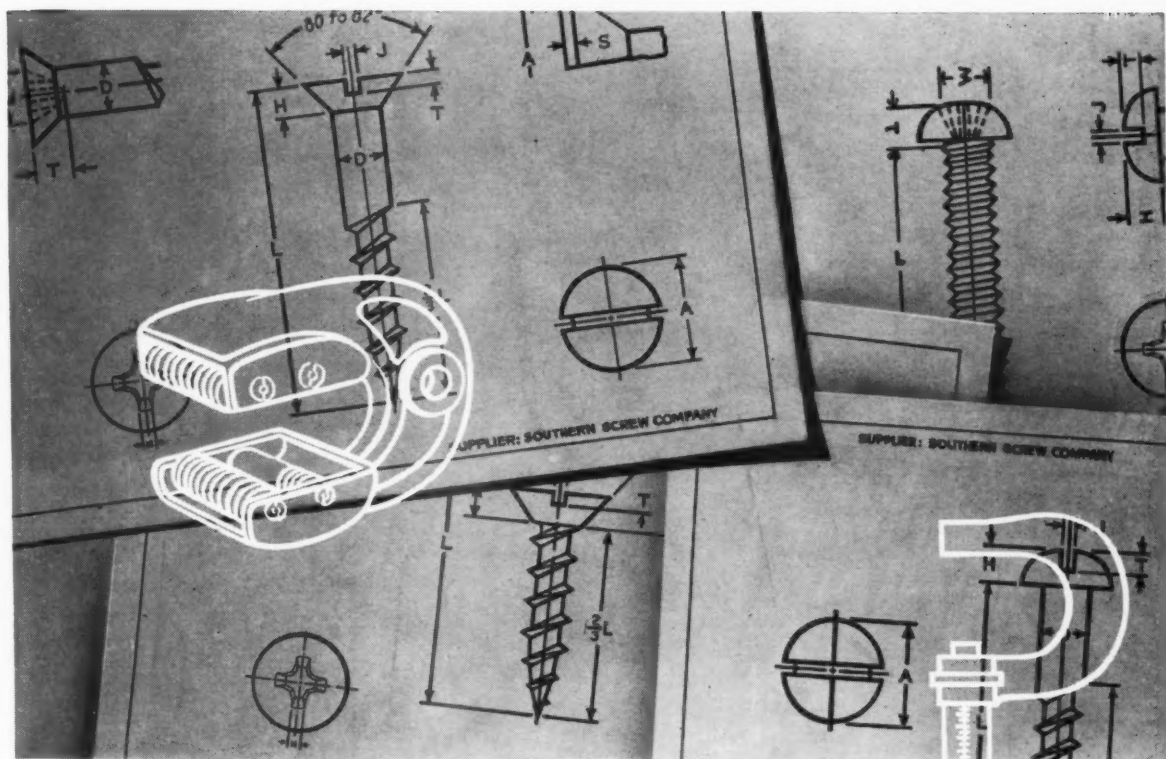
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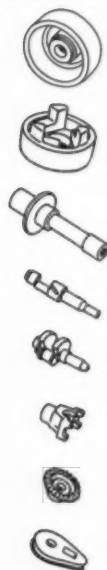
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## WARHEADS\* THAT EXPLODED AN OLD THEORY.....



...that all castings had to be big, thick and sometimes cumbersome...had to undergo heavy machining and finishing to even approach accuracy of specification.

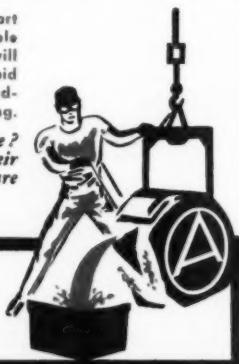
Not so today! The Warheads\* are another interesting example of how Albion's resin shell casting process has eliminated much of the casting-finishing cost...and, permitted broader utilization of ferritic and pearlitic malleable irons.

As an example, both the castings above appear to be the same on the outside...and both are of the same material. Yet, one is far lighter, thinner-walled and accurate...requiring far less machining, finishing time. Another positive proof that Albion's resin shell casting process permits closer tolerances, less excess metal—resulting in savings from the laboratory through finishing.

Albion's ferritic and pearlitic malleable irons can be cast to your exacting specifications with physical properties to suit your needs.

Make malleable iron, the versatile metal, a part of your product. Contact your Albion Malleable Iron Company representative today; he will be glad to bring you up-to-date on the rapid development in casting techniques and advantages that can be yours for the asking.

● Need design or engineering assistance? Albion's competent staff as well as their Research and Development Laboratory are always at your service.



\* 155 MM Projectile Ogive

**ALBION MALLEABLE  
IRON CO.** Albion, Michigan

## MEETINGS

### PMI NATIONAL MEETING

Annual spring technical meeting of Pressed Metal Institute, Hotel Carter, Cleveland, Ohio, March 6-8, 1957.

### NACE MEETING

National Assn. of Corrosion Engineers Meeting, Kiel Auditorium, St. Louis, Mo., Mar. 11-15.

### ASTE CONVENTION

American Society of Tool Engineers Silver Anniversary Convention and Annual Meeting, Shamrock Hilton Hotel, Houston, Texas, March 23-28, 1957.

### TENTH METAL EXPOSITION

Tenth Western Metal Exposition and Congress, American Society for Metals and Technical Groups, Pan-Pacific Auditorium and Ambassador hotel, Los Angeles, Calif., March 25-29, 1957.

### GAMA ANNUAL MEETING

The Gas Appliance Mfrs. Assn., annual meeting, The Greenbrier, White Sulphur Springs, West Virginia, April 8-10.

### WELDING SOCIETY MEET

National Spring Meeting of American Welding Society, and Fifth Welding and Allied Industry Exposition, Hotel Sheraton and Conventional Hall, Philadelphia, Pa., April 8-12, 1957.

### ELECTRONICS MEET

Conference on Electronics in Industry, sponsored by Armour Research Foundation and Professional Group on Industrial Electronics, IRE, Illinois Institute of Technology Campus, Chicago, April 9-10.

### AHMA ANNUAL MEET

American Home Laundry Manufacturers' Assn. Annual Meeting, French Lick Springs hotel, French Lick, Ind., April 14-17.

### NIRC MEETING

National Industrial Research Conference, sponsored by Armour Research Foundation, Conrad Hilton Hotel, Chicago, April 24-25.

### MEC MEETING

Midwest Enamellers Club Maypole Party, White Pines Country Club, Bensenville, Ill., May 24, 1957.

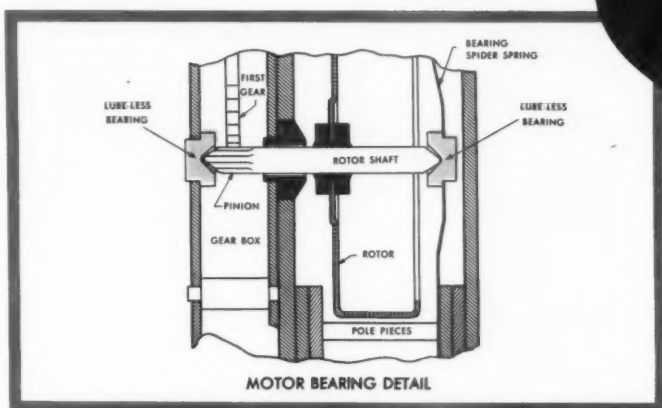
MARCH • 1957 MPM



**Prevent  
RANGE  
TIMER  
"GUM-UP"  
with amazing**



**LUBE-LESS  
BEARING  
MOTOR**



**HERE'S WHY RANGE TIMER "GUM-UP" AND RESULTANT TIMER FAILURE  
JUST CAN'T HAPPEN WITH THE NEW LUX LUBE-LESS MOTOR.**

The Lux synchronous motor rotor bearings require NO LUBRICATION. Absence of lubricants prevents formation of gummy residues . . . primary cause of failure in range timing motors required to operate in the presence of heat. Mechanism is completely enclosed in dustproof case.

Rounded ends of the rotor shaft ride in cup-shaped bearings, with a specially designed spider spring mount taking up end play. This *exclusive Lux development* assures constant torque output and continuous accurate positioning of the rotor pinion in relation to the first gear. In addition, wear-and-noise producing shaft vibration is completely eliminated.

First pinion is cut integrally with the rotor shaft, eliminating any possibility of pinion rattle. This design also makes possible a small pitch diameter which permits a low feet per minute speed and a slower speed of gear reduction unit.

Lux synchronous timing motors are engineered and constructed to perform reliably and accurately under the most severe operating conditions. Quietness is retained even through long and continuous runs. Stalling for indefinite periods is possible without injury.

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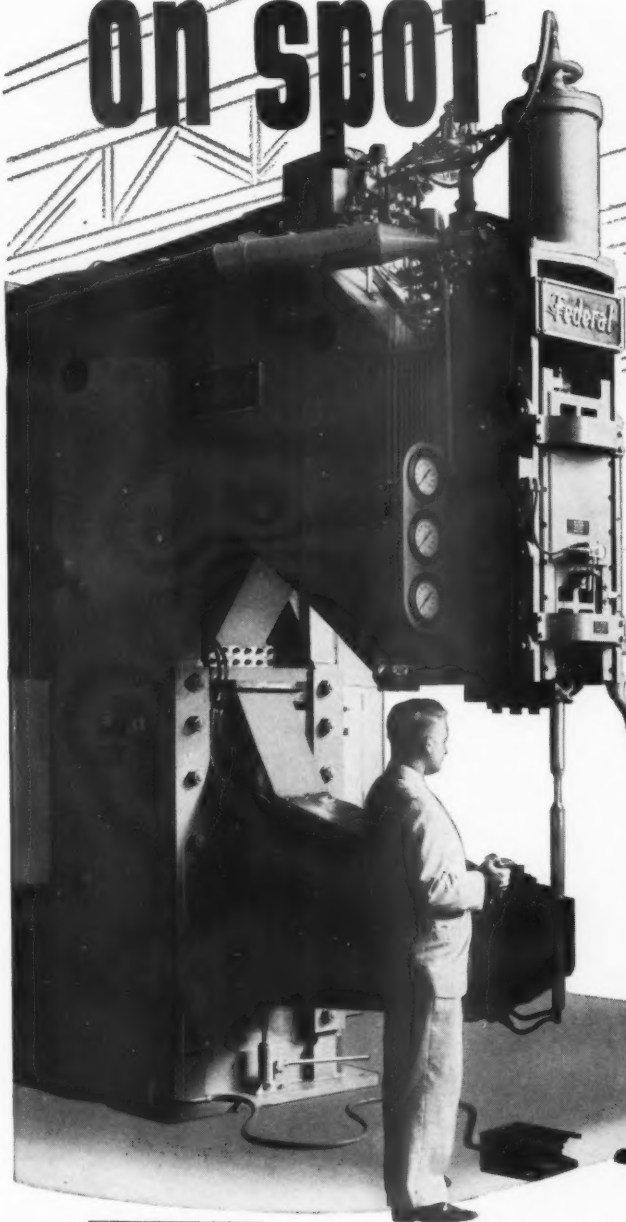
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Fabricated Metal Products Industry**

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—top management, purchasing, engineering,  
and key plant management and supervision  
—with circulation 100% verified  
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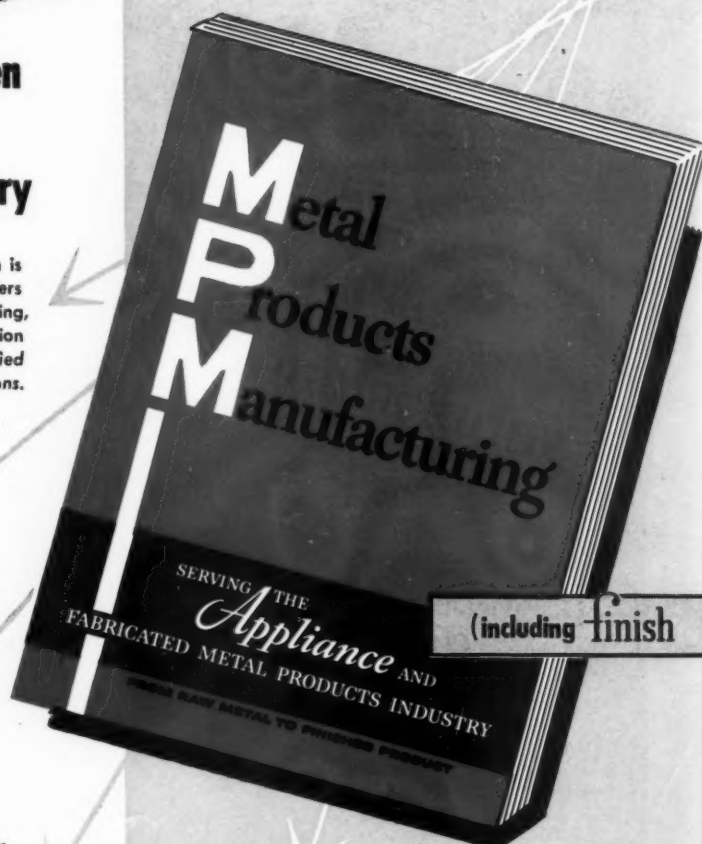
**BASIC** - - - because its complete editorial service  
"from raw metal to finished product"  
makes MPM the prime source of  
industry information for its qualified audience.

**BASIC** - - - because for 13 years,  
The Magazine of Appliance and  
Metal Products Manufacturing has consistently  
shown gains in advertising performance  
—gains in revenue more than triple  
those of the industrial publication average.

**BASIC** - - - because leading manufacturers  
of materials, components, equipment and services  
have learned first-hand of the  
sales effectiveness of the magazine.

**MPM SHOULD BE YOUR BASIC BUY TO SELL THE FIELD OF  
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... for selling manufacturers of home  
appliances, radio and television sets,  
plus a broad group of fabricated metal  
products such as business machines,  
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*the name is* **NEW...**

Effective with the February, 1957 issue, the  
name METAL PRODUCTS MANUFACTUR-  
ING will replace *finish*, the Magazine of  
Appliance and Metal Products Manufacturing.  
This change in name is merely a reflection of  
the full editorial scope — blanketing all phases  
and processes in appliance and fabricated metal  
products manufacturing — which has been in

effect since the January 1949 issue.

Only the name has been changed. MPM will  
continue to be the most important source of  
industry information for those engaged in metal  
products fabrication and manufacturing, and  
the most important sales tool for those adver-  
tisers who sell to them.

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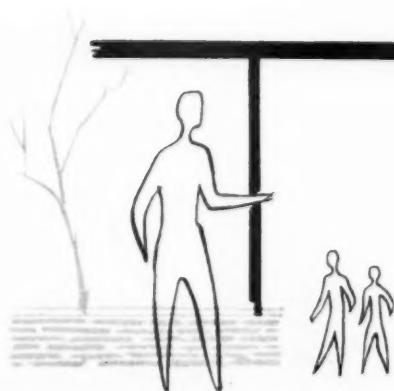
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\*[SPE'CIAL·IST—One who devotes himself to some special branch of activity.]

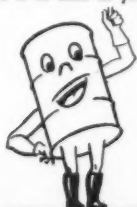
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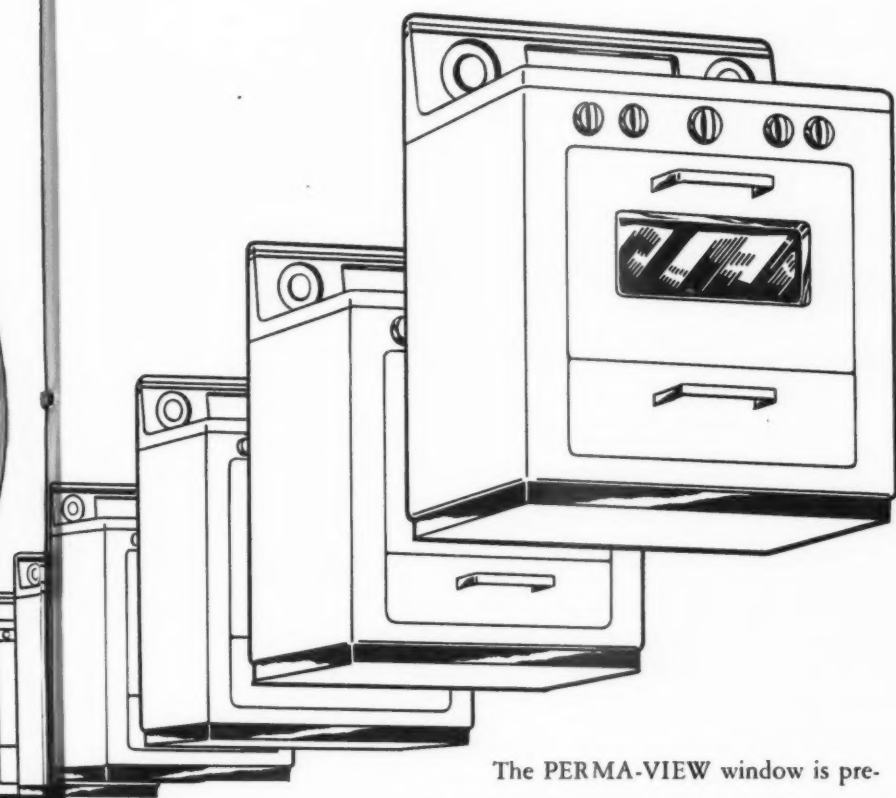
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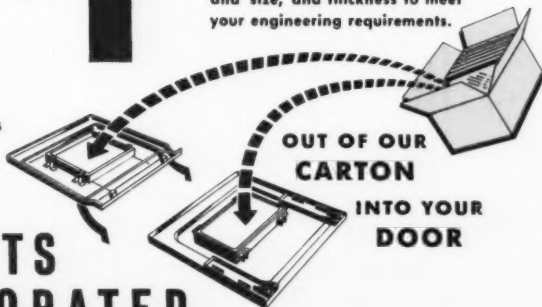
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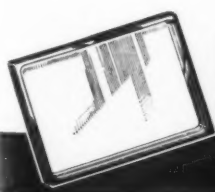


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## SUPPLIER PERSONALS

Appointment of *Richard Rehm* as project engineer, and promotion of *Wendell Disbro* to chief draftsman, has been announced by H. W. Tuttle & Co., Adrian, Mich., manufacturers of electric heating elements. Rehm was formerly assistant professor of engineering drawings at the University of Toledo, and prior to joining H. W. Tuttle & Co., he was with Surface Combustion Corporation, Toledo, Ohio, as a designer engineer. Disbro, promoted to chief draftsman, joined H. W. Tuttle & Co., in 1951 as a mechanical draftsman and, for the past two years, has assisted in the design and development of all products.



REHM



DISBRO

Promotion of *William J. Esselstyn* to manage organic intermediates and new product sales for the Chlorinated Products Division of Diamond Alkali Co., Cleveland, Ohio, was announced by L. J. Polite, Jr., divisional sales manager.

At his newly-created position, Esselstyn will hold sales responsibility for Diamond chlorinated intermediates and related organic chemicals, coordinate divisional technical service activities covering Diamond solvents and organic intermediates, and supervise bulk-terminal operations on these products.

Allegheny Steel Band Co., manufacturer of steel strapping and accessories, has announced the following appointments: *J. H. Bowman, Jr.*, vice president-sales; *H. B. Bowman*, vice president-operations; *L. J. Frey*, general manager-sales; *R. K. Scharff*, Eastern division manager; *J. L. Brewer*, Washington, D. C., district manager; *D. S. Hodges*, Cincinnati district manager; and *T. A. Kearns*, head of inside sales.

The Grigoleit Company, Decatur, Ill., has announced three promotions: *Fred W. Sobottka* is now assistant sales manager following earlier service in engineering and product engineer capacities. *Jack M. MacLennan* has been made sales representative in the Southern

to Page 83 →

## ALUMINUM PERMANENT MOLD CASTINGS



ITEM No. 1



ITEM No. 3

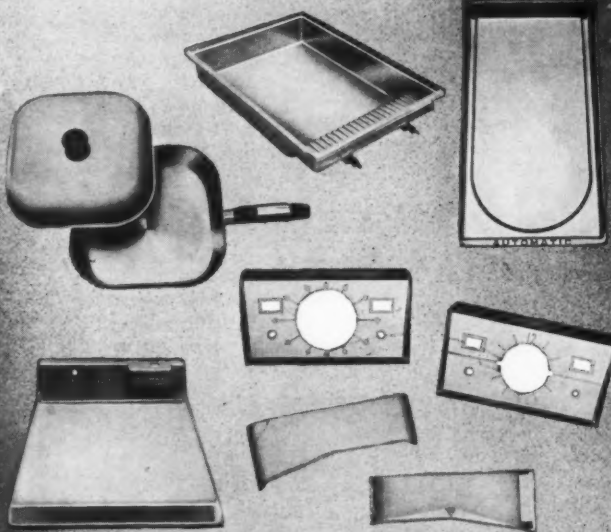


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**DIRECTORS** of the National Housewares Manufacturers' Assn., with Chicago's Mayor Richard J. Daley, as he proclaims Jan. 17-24 Housewares Week in Chicago. L to r.: E. H. Gorton, Wooster Rubber Co.; H. C. Forster, Ekco Products Co.; J. M. Jayne, The Plas-Tex Corp.; W. E. O'Brien, Toastmaster Products Div., McGraw-Edison Co.; Chester M. McCreery, NHMA; Mayor Daley; J. M. Bredfeld, Corning Glass Works; C. O. Hamilton, Hamilton Manufacturing Corp.; G. C. Kubitz, Aluminum Goods Manufacturing Co.; and J. A. Kaplan, Joseph A. Kaplan & Sons, Inc.



**STEAM AND DRY** iron, by Toastmaster, is filled under cap at front of handle. When cap is raised, valve to steam chamber is closed automatically to prevent steaming or flooding. Iron has all-fabric heat control.

**ILLUMINATED** from below by floodlights, the ramp leading into the Lennox display at National Assn. of Home Builders meet is made of expanded metal. The clear-plastic column—one of three in the display—encloses a chic gloved hand holding a huge hand mirror. At left is new air cooled condenser-compressor unit.



## the MPM . . .

on the theory that one photo equals one picture will bring you many photos and equipment in the fabricated



**EASY'S** new unique 1957 Regent automatic washer is the answer to this housewife's washday problems! The all-new, safe-for-ALL-fabrics Regent, with its "Fabulous Five" control center, features the first five-temperature wash water selector ever devised for an automatic washing unit.



**BRYANT** gas furnace salesmen literally can take their product into a prospect's home with a new and unique portable controls kit. Designed by Bryant engineers, the kit contains a set of the company's exclusive controls—diaphragm valve, pilot, and pushbutton ignition system. Kit also contains tiny LP gas bottle.

## ... foto-news

thousand words this MPM foto-news fea-  
few words about people, products and  
metal products field . . . .



LIGHT in weight, and easily handled, this new type of translucent plastic panel with studded aluminum mesh has tremendous impact strength. Manufactured by the Resolite Corp., Zelienople, Pa., "Security Junior" panels offer unusual architectural design possibilities.



ULTRASONIC dishwashing—a revolutionary preview of 1960 homemaking—was introduced by Hotpoint for the first time in history at the Winter Home Furnishings Market, Chicago. Twin dishwashers wash and dry a complete dinner service for 16 persons, and are built into a completely automatic electric clean-up center.



SURPRISE CAKE, topped with candles and cut in various sizes, was presented to division managers of the Geo. D. Roper Corp., Rockford, Ill., at the company's annual sales conference. Each slice represented sales expected. L. to r.: J. K. Busch, R. R. Chapman, N. C. Kreuter, vice president and sales manager; W. G. Parks, and G. W. Baldwin.

GIANT-SIZE Blendor, made by Waring, has a one gallon capacity for mixing at three different speeds. The zinc die casting structural components provide the required strength and durability for such heavy-duty mixing jobs.



BRAND NEW is this "Steelaire" residence by United States Steel Homes, division of U. S. Steel Corp., Harrisburg, Pa. The home utilizes more than six tons of steel in both structural and decorative applications. In addition to roof trusses and panel members, steel is also used in gable ends, fascia, soffit trim, and interior doors.





# THE MPM *spotlight*



Westinghouse shows "Do-it-yourself" coffee break appliance, designed to keep the growing tradition of a coffee break from turning office routine into chaos. This new "hot and cold" water cooler delivers 190 degree hot, as well as ice cold water and can be equipped with food file shown at right in photo.



# Assembly line technique for welding air conditioner chassis

**this electric resistance welding line for fabricating air conditioner chassis and wrappers helped York Division of Borg-Warner cut chassis assembly costs 34.5% and wrapper assembly costs 60.9%**

**T**HIS photo story, showing the steps in the welding of air conditioner chassis and wrapper parts at the York Division of Borg-Warner Corporation, York, Pennsylvania, shows how this leading air conditioner manufacturer adapted production line methods for the welding line used to fabricate the primary structures for their room air conditioning units. The company feels that as a result of the technique used they are building a better air conditioner in less time and at lower costs. A breakdown of cost savings indicates that on complex chassis assembly there has been a reduction of 34.5% in assembly costs and a reduction of 60.9% in assembly costs for the wrapper.

In the fabrication line, shown photographically in this article, there are six standard welders, a two gun portable unit, and a wrapper machine, which are used to assemble the rather complex air conditioner chassis in straight line production sequence. These operations apply for the one-half, three-fourths, and one ton size air conditioners.

The welders are all standard models, adapted with tooling and fixtures for each fastening operation. The line produces 90 assemblies per hour. The original planning provides for changes in fastening operations and for ease of changeover for new models.

In setting up the production line, each part of the conditioner assembly was studied and consideration given to special design equipment. After the analysis was completed, it was decided to employ the multiple assembly line technique.

A total of twelve different steel parts of various sizes and shapes are joined to fabricate the base of the air conditioning unit. Material thicknesses range from .040" to .110". Four of the parts

are mounted to the side of the unit at a 90° angle.

## Seven welding machines used

Seven welding machines are used to projection weld twelve different piece parts to the .080" steel pan. The last machine on the line is a portable unit containing two welding guns to join the plenum condenser to the pan and a stabilizer to the scroll. These gun welds complete operations at Station 7. The other six machines of the line are basically standard type projection welders adapted with fixtures.

To provide for fastening the pan piece parts with their thicknesses ranging from .040" to .110", the ratings of the main welding transformers vary from 50 to 250 KVA. Throat depths measure from 5" to 18½", with pneumatic head pressures ranging from 2,000 lbs. to 6,000 lbs.

## Three operators

Three workmen are required to operate the line. The first loads and welds at the first three stations. The second operator handles Stations 4, 5 and 6, and the third operates the portable guns.

Welding begins through Stations 1, 2 and 3, while Stations 4, 5 and 6 are being loaded. The first operator begins with a piece part at Station 1 where he completes the weld, moves on to Station 2 and then in sequence to Station 3. Operator two, having loaded his equipment, takes over the piece part unit from the preceding station and welds at Station 4, 5 and 6 in sequence. In the meantime, Operator one is reloading Stations 1, 2 and 3.

As operator two finishes the welding at Station 5 he moves the pan assembly to a turn-table, reverses the assembly's position 180° and then welds at Station

6. The part is then passed on to the gun welder at Station 7 for the final fastenings.

The welding machines at Stations 1 through 6 are individually actuated through limit switches as the pan is moved into welding position.

The simplicity of the operations makes it feasible to train three operators for all of the three work assignments, so that they may alternate when desirable.

## Wrapper Fabrication

In the assembly of the wrapper, the first step in this separate operation is to load into the holding fixture two .110" reinforcing angles, three .040" insulation clips, and two .040" door clips. The wrapper is then placed over these parts.

Using direct welding and in four strokes of the machine, 37 projection welds are made joining 7 parts. The wrapper is folded twice to 90° angles to form three sides of the air conditioning unit.

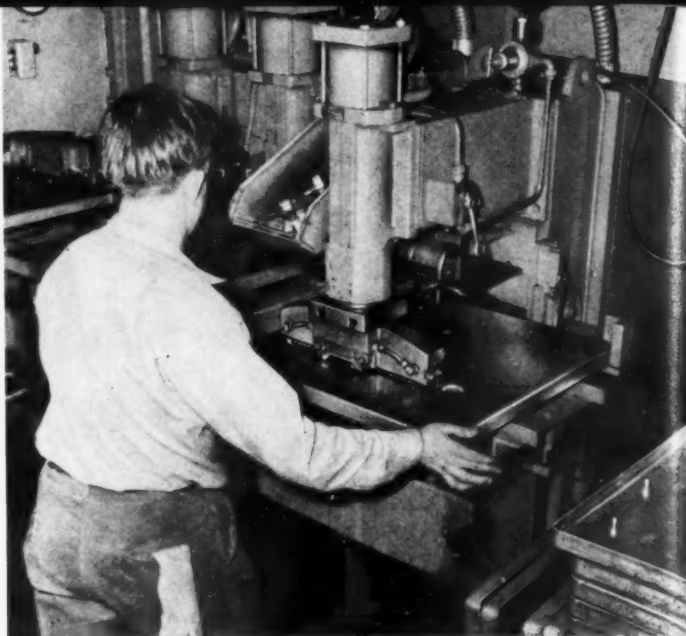
The operator pushes a button which indexes the fixture into welding position. Then he pushes the sequence button which initiates the welding sequence. The disconnects come in, the vertical guns descend and apply pressure. In three firings all the welds are made with the vertical guns.

At the end of the off time, the vertical guns retract and the horizontal guns come in and weld, using one of the previous weld timers and ignitron contractors from the cascade firing circuit. At the end of the second sequence the disconnects retract, the horizontal guns retract and then the fixture indexes out.

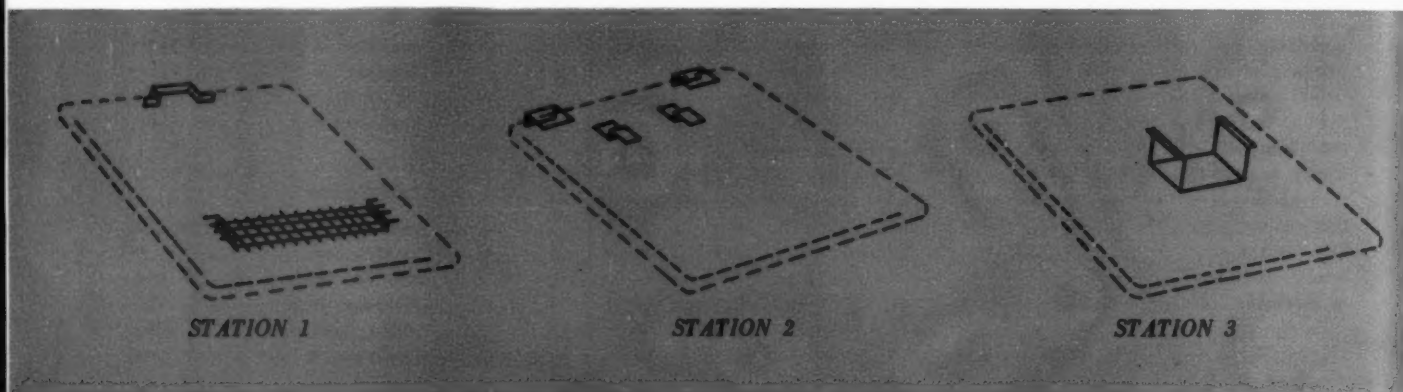
*continue for three pages of photos and sketches showing welding operations →*



**STATION 1** — Two operations are performed here on a 50 KVA machine as a handle is projection welded to a .080" pan. The handle is used to pull the pan from the wrapper. Two projections in the pan are provided.

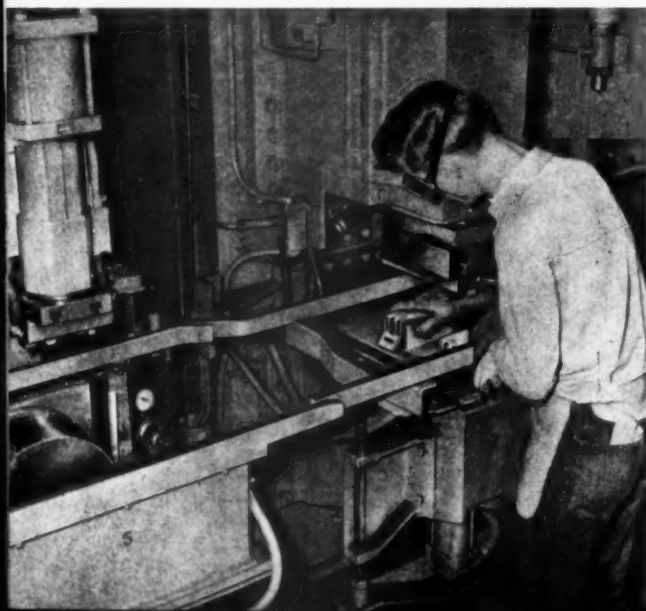


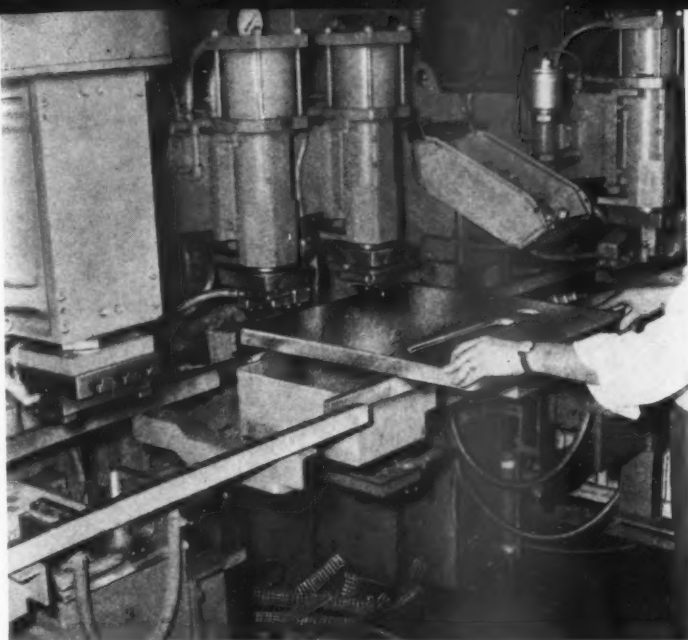
**STATION 1** — (second operation) The pan has been moved into the throat of the machine and is now on a horizontal plane. A 2-1/16" wide screen to cover the intake opening of the pan is welded here.



**LOADING**—At Station 4, Operator 2 completes his last loading operation, which consists of setting into place a compressor mounting bracket. He has just set an .040" evaporator scroll partition into the holding fixture at Station 5 to his left.

**STATION 3** — First welds have been completed. A motor mounting bracket of .080" mild steel is now fastened to the under surface of the pan. Five projections in the bracket are used. The piece is now ready for transfer to Operator 2.

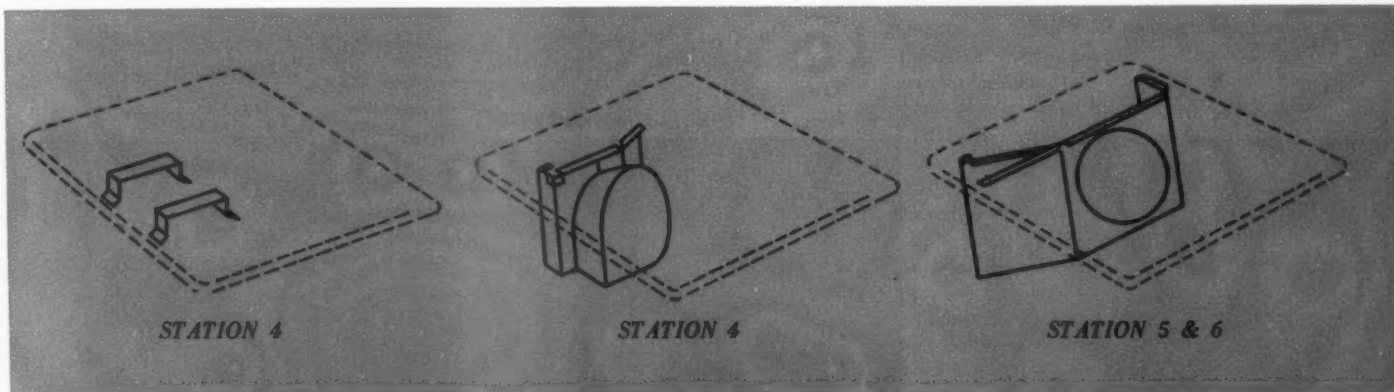




**STATION 2** — This machine welds four .040" clips to the pan in one operation. Eight projections in the pan are required. The two upper clips are used to retain the cover, while the two inside clips are used to support the evaporation drip pan.

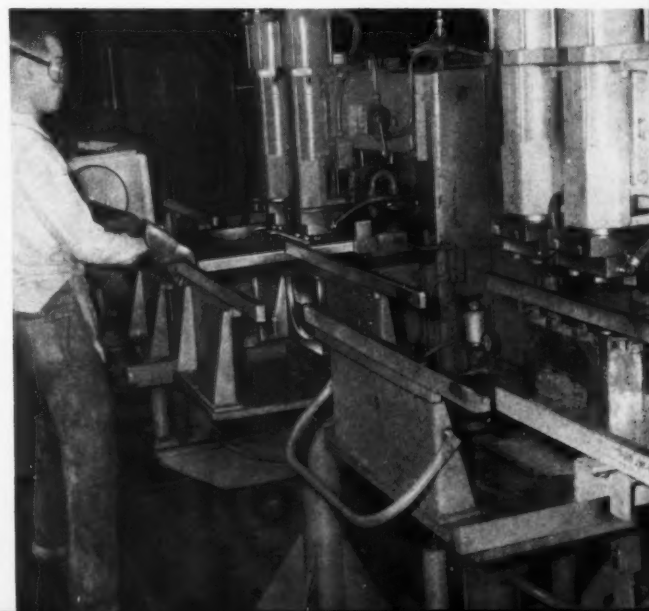


**LOADING** — While the first three welding operations are in progress, Operator 2 loads piece parts into his three stations. He is at Station 6 putting a .040" plenum condenser chamber into place. Seven projections on the pan are needed to hold this part.

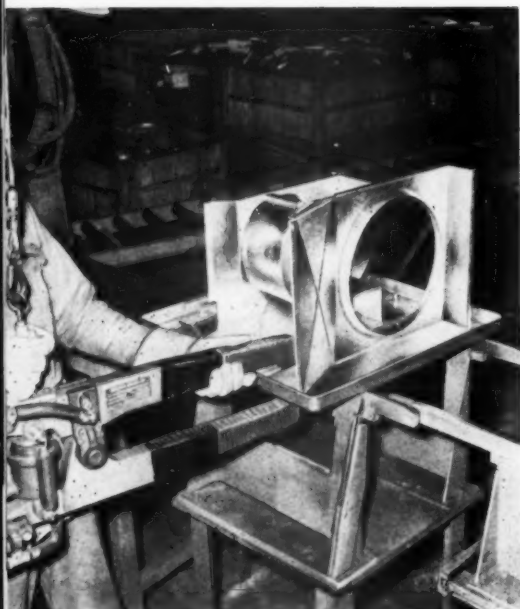


**STATION 4** — In one stroke this machine welds two .110" compressor mounting brackets to the pan. Eight projections. The assembly will next slide on the guide rails to Station 5 where six pan projections will weld the evaporator scroll partition.

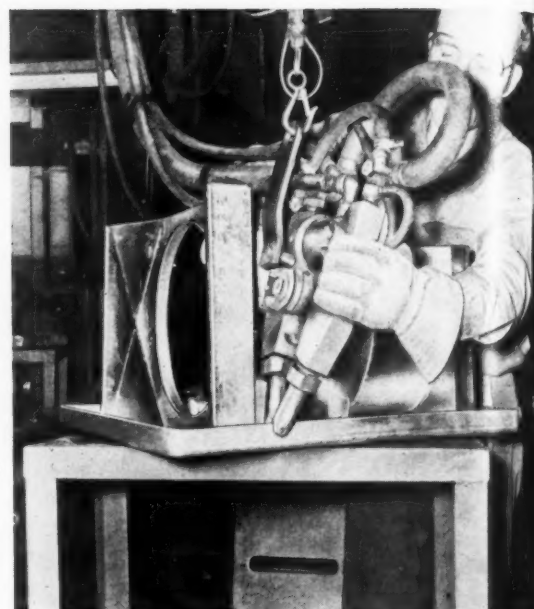
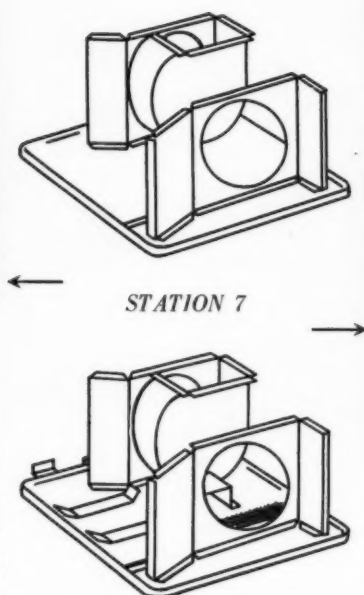
**STATION 5 & 6** — Leaving Station 5 the pan is moved to a turntable and rotated 180°. It then moves to Station 6 (operator's position in photo) where in one stroke the plenum condenser chamber is welded to the pan.







**STATION 7**—The pan assembly has been turned over 180° so that piece parts point upward. A portable unit with two guns makes the final welds. In three strokes the large gun welds the .040" scroll stabilizer clip and two .040" plenum condenser stabilizer clips to the pan.



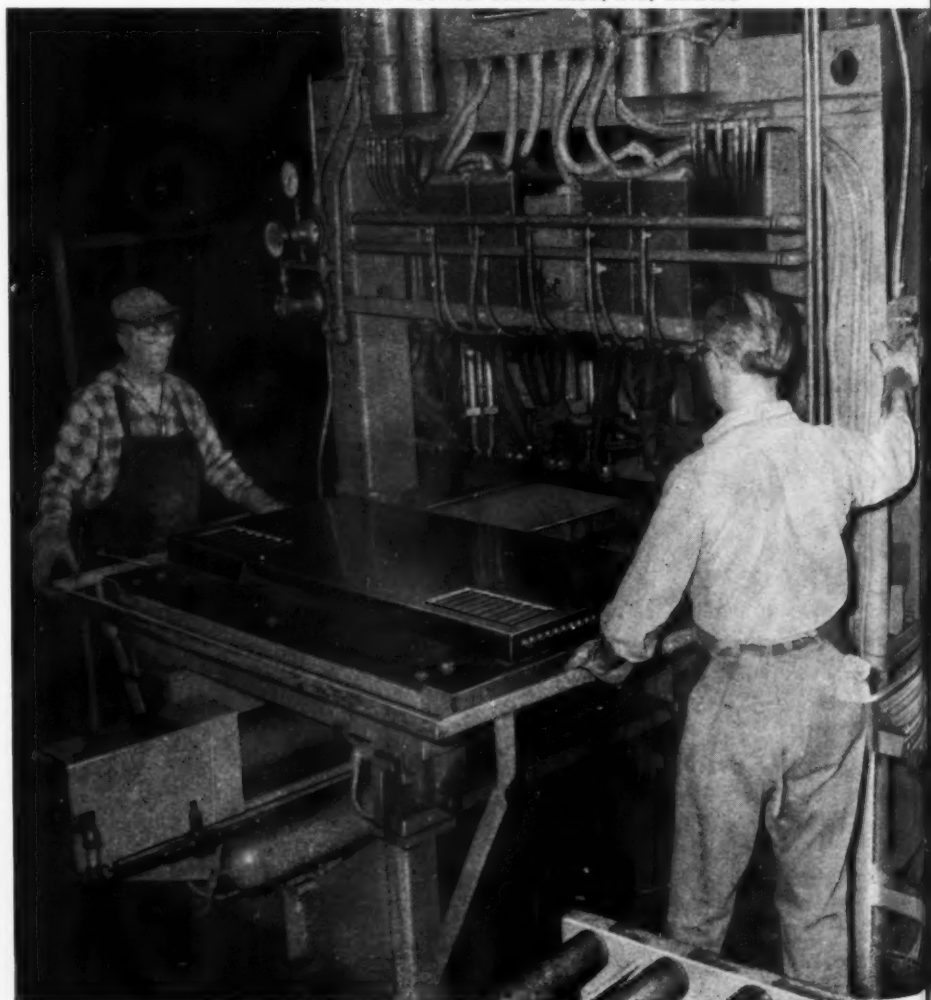
**STATION 7**—Operator 3 then slides the unit to another table to effect the last operations. A small gun welds each side of the plenum condenser to the pan in two strokes. A projection in each side of the pan is required.

ALL PHOTOGRAPHS COURTESY SCIAKY BROS., INC., CHICAGO



**WRAPPER ASSEMBLY**—The first step of this separate operation is to load into the holding fixtures two .110" reinforcing angles, three .040" insulation clips, and two .040" door clips. The wrapper is then placed over these piece parts.

**FINAL SUB-ASSEMBLY**—In four strokes of this machine 37 welds are made joining the seven parts to the wrapper. All of these require projection—10 each on the support angles, a total of 13 on the insulation retaining clips, and a total of 4 on the door clips.





# Magnetic testing as an assist to production quality control

includes basic information on magnetics, reasons for quality control testing  
and describes the tests applicable to a wide variety of manufactured products

by *Gerald T. Barta* • SENIOR DEVELOPMENT ENGINEER, THE INDIANA STEEL PRODUCTS COMPANY

CUSTOMER acceptance of any product depends upon its meeting certain design and engineering specifications. These specifications — imposed so that the end product will function in a satisfactory manner — relate not only to physical characteristics, such as size, shape, weight, and appearance, but also in the case of a permanent magnet, to the magnetic properties.

## Reasons for testing

Permanent magnets may conform to all of the physical and chemical specifications desired, but are useless unless the flux output in the customer's product is at a satisfactory level. Obtaining the proper magnetic qualities is an exacting procedure, since there are many factors which have a direct bearing on the end results. The purity of the raw materials, composition of the melt, pouring temperature, heat treatment (temperature, time and cycles) and grinding procedures all contribute to producing a satisfactory magnetic product.

Just as it is important to measure the physical and chemical characteristics of permanent magnets, it is likewise important to determine if the magnets meet a specified magnetic quality level. Much has been written on the validity of permanent magnet test methods. Consequently, the scope of this article will be confined to a brief discussion of the fundamental factors affecting the use and operation of permanent magnets and of the production test methods and their value.

## Basic Magnetics

A permanent magnet is a body which supports a magnetic field external to itself. This field is visualized as lines of flux and is referred to as maxwells in the cgs (centimeter-gram-second) system. These maxwells or flux lines com-

plete a circuit from one magnet pole to another. A compass illustrates this phenomenon, as it will align itself with the earth's magnetic flux lines. The compass needle is a permanent magnet, which tends to align itself with the direction of the earth's magnetic field.

Referring to Fig. 1 which shows a magnetization curve and complete major hysteresis loop, we find that the magnetizing force (oersteds) is indicated on the X axis and the induction (gausses) on the Y axis. The unit of magnetizing force in the cgs system is gilberts per centimeter defined as oersteds, and the unit of induction is called gauss or maxwells (or lines) per square centimeter.

A material which has not been previously magnetized or which has been carefully demagnetized will follow the curve from O to  $B_{max}$  as the magnetizing force is increased.  $B_{max}$  results from a magnetizing force of  $H_p$ . If this magnetizing force is then gradually decreased to 0, the resultant curve from  $B_{max}$  to  $B_r$  is obtained.  $B_r$  is known as residual induction and is one of the possible bases for magnetic specifications.

Gradually applying a reverse magnetizing force, known as a demagnetizing force, will give the demagnetization curve of the permanent magnet which crosses the X axis at  $H_c$ . At this point the induction of the material is reduced to 0, and another significant test point or basis for specification known as coercive force ( $H_c$ ) is had. The shape of the demagnetization curve (that portion from  $B_r$  to  $H_c$ ) is extremely important with respect to magnet testing and magnetic output.

It then follows that a further increase in the demagnetizing force will complete the curve from  $H_c$  to  $-B_{max}$  (which is equal to  $B_{max}$ , but of opposite polarity). One half of the complete major hystere-

sis loop is thus obtained and the remainder is symmetrical. This hysteresis loop is typical for all types of magnetic materials.

Fig. 2 illustrates a typical degmagnetization and energy product curve. The product of  $B_d$  and  $H_d$  gives the energy product at any point on the demagnetization curve. The point of maximum energy  $(B_d H_d)_{max}$  identifies the peak energy product and, as such, is another important specification which may be evaluated by magnetic testing.

The permeance coefficient (slope line, shear line, air gap line), shown typically in Fig. 2, is the ratio of the total external permeance to the permeance of the space occupied by the magnet. The slope of this line is determined by the geometry of the magnetic circuit which includes pole pieces, air gaps and magnet dimensions. The point of intersection with the demagnetizing curve gives the operating point which is the fourth and most important point when setting magnetic specifications for testing. The flux output obtained with actual opera-

The Author



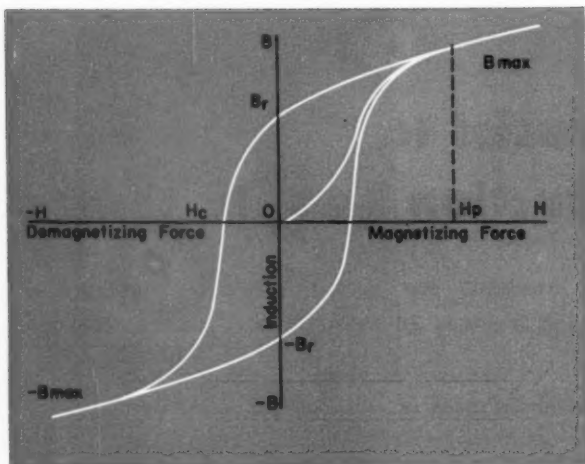


FIGURE 1. Normal magnetization curve and major hysteresis loop.

#### Test methods

There are two basic types of magnetic circuits: (1) the open circuit; and (2) the circuit in which the magnet is used in conjunction with pole pieces and/or other steel parts.

In order to meet required quality standards, it is necessary that magnets be tested in a manner similar to their usage. This is not possible in all cases; however, there are special circuits which are used to simulate the actual magnetic circuit in the customer's product.

The most simple, single-point test method is the open-circuit test illustrated in Fig. 4. A search coil connected to a fluxmeter is placed around the neutral section of a properly saturated permanent magnet in the open-circuit condition. The coil is quickly removed and, as mentioned before, cuts the lines of the flux giving a deflection on the fluxmeter. In order to get an accurate indication of all the lines of flux, it is necessary that the coil be a close fitting one, otherwise some of the maxwells will not be cut by the coil.

Since a great number of magnets are designed to work in circuits containing steel and not in the open-circuit condition, it is necessary to construct test fixtures with soft steel components. This second method of testing permanent magnets is essentially the same as the open-circuit test. In this case, however, the size and shape of the magnetic circuit and pole pieces, as well as the air gap, are dependent upon the user's magnetic circuit. The search coil may be placed around the magnet, located in the steel circuit, or even in the air gap. (see Fig. 5 on the following page).

tion in the customer's unit is obviously extremely important and is dependent upon the shape of the curve at or near the operating slope.

When testing magnets used in circuits having changing demagnetizing influences, it is usually best to check at the point of greatest demagnetizing influence.

#### Basic test equipment

Two basic elements of nearly every magnet testing device are a search coil and an indicating instrument. The search coil consists of one or more turns of wire having a definite area and shape. It is a well-known fact that voltage is generated when a conductor cuts lines of flux. If a coil is inserted into a magnetic field and then removed in such a manner as to cut the lines of flux, voltage is generated. Every electrical power generating station which generates electricity for home and industrial use is based on this principle.

In the case of permanent magnet testing, this voltage is very small, but is real nevertheless. The application of this voltage to an indicating instrument having a long, natural period of vibration will give a deflection almost proportional to the product of the turns of the coil and the flux lines threading the coil. It is easy to see that the deflection of the indicating instrument is proportional to the strength or quality level of the magnet tested. The satisfactory operation of the magnet in an application is dependent upon its magnetic strength or lines of flux produced when properly magnetized. A reference magnet is usually used to establish a

calibration in production testing and all subsequent testing is based on that standard. Thus, we have a method of assuring that the properly tested magnet which passes a minimum standard will give satisfactory results.

Common indicating instruments used for this purpose are the ballistic galvanometer (see Fig. 3) and the fluxmeter. The ballistic galvanometer is an extremely sensitive and accurate instrument used to establish standard or reference magnets for production testing. In some cases, when more accurate work is required, the galvanometer is also used for production testing. However, for most production testing, the fluxmeter is used. This unit is essentially a ballistic galvanometer with little or no restoring force. It is slightly less accurate than a galvanometer, but faster, thus lending itself to routine acceptance tests, applicable to plant laboratories.

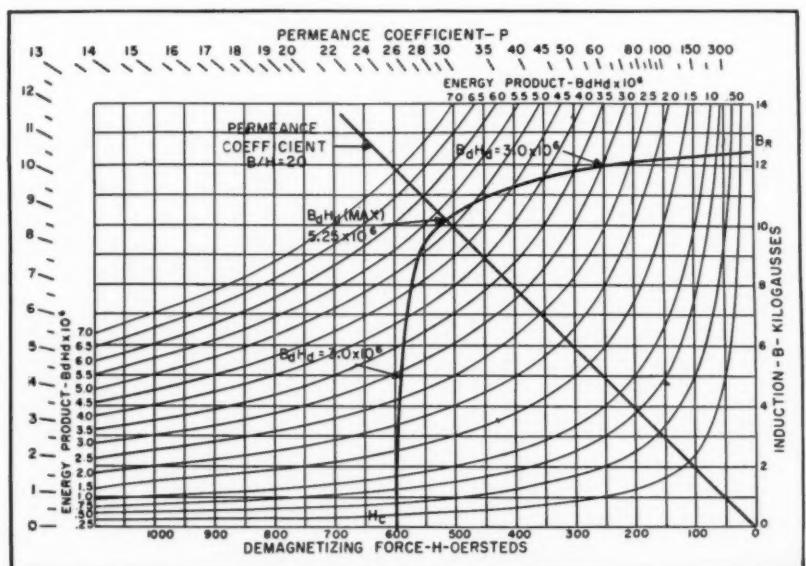


FIGURE 2. Demagnetization and energy product curve originated by The Indiana Steel Products Co.

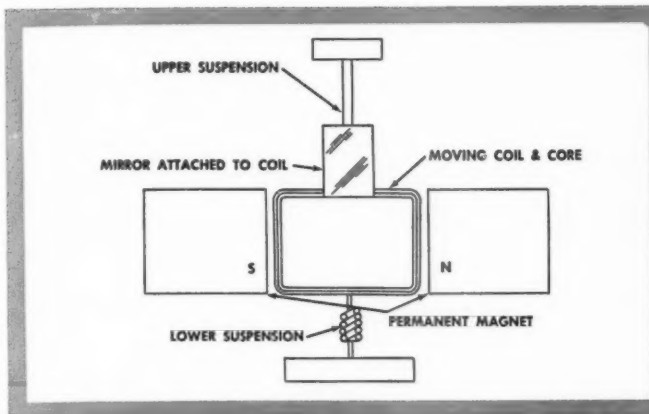


FIGURE 3. Ballistic galvanometer.

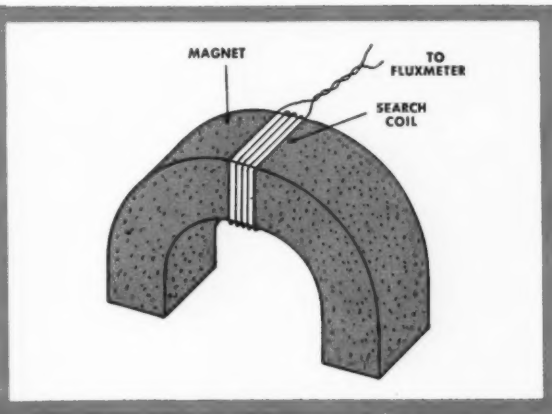


FIGURE 4. Open circuit test.

A third method takes into account pull and lift tests, measurement of the damping force on a disc rotating in the magnetic field, the use of gaussmeters and oscilloscope hysteresis tracers.

There are fixture tests utilizing more than a single-point test that will give values for two different operating points. Since it is possible for a demagnetization curve to become distorted, a single-point test which favors the residual or the coercive part of the curve might pass magnets which are low on the opposite end of the curve. The slight variation which can occur does not appreciably affect the magnets used in an application, because the method of testing utilizes the user's actual or simulated magnetic circuit.

Production testing is sometimes done after the magnet is stabilized or conditioned. This may range from such simple methods as open-circuiting the magnet after magnetizing and placing it on the test fixture (or in the case of pull or lift tests, placing the magnet poles on the soft steel surface and removing) to a very precise and carefully controlled "knock-down" in a coil. These demagnetizing influences (stabilization) are normally as severe as is expected to be present during normal operating conditions.

Production tests are based on relative, not absolute, values. The magnetic requirements and needs of the customer should be investigated. From the information thus derived, minimum performance requirements are established, and a reference standard magnet is selected which usually gives minimum test values. Production testing is based on the comparison of the magnets tested

to the reference or master magnet. This method of testing gives greatest economy and assures magnetic quality equal to that obtained by testing for absolute values.

#### Proper magnetizing important

It is of the utmost importance that the magnet be properly magnetized before any testing occurs. Sufficient magnetizing force, as well as proper alignment or direction of the magnetizing field, must be present, or inaccurate test values will be obtained. *Although most magnets are demagnetized before shipment, it is necessary to magnetize them properly to obtain a true test and to give an accurate evaluation of their magnetic quality.*

It is possible that even with the most precise equipment, variations in test results can occur. Fortunately, the large share of these variations tend to reject good magnets rather than pass poor ones. Improper location and poor contact of magnets in test fixtures, slow speed in removing coils from magnets, and improper location of test coils on magnets, may give readings which are less than true values. Conceivably, readings either above or below the actual values can be obtained by improper zeroing or inaccurate readings of the indicating meters. In the case of stabi-

lized tests, improper demagnetizing will give values either above or below actual values depending upon whether the demagnetizing current is less or greater than specified.

#### Open-circuit tests

At this point it might be well to investigate some of the details regarding actual tests and how these tests relate to specific applications. These tests may be broken down into three categories: open-circuit, fixture, and miscellaneous.

Open-circuit tests can be divided into two main groups. In the first method, the test coil is placed around the yoke or neutral section of the properly magnetized magnet, the meter zeroed, and the coil quickly removed (see Fig. 4). Magnets which operate at or near the "knee" (i.e. the maximum energy point on the demagnetization curve in the open-circuit condition as well as in the actual application) are tested in this manner. "U" type separator magnets, used industry-wide for protection against machinery and equipment damage, against fire, and against contamination of food, chemicals and medicines, can be tested in the open-circuit manner. Permanent magnets used in the slug-rejector unit of coin-vending machines can also be tested by this method.

to Page 78 →

FIGURE 5. Pull-off test fixtures (with fluxmeters). Bar-type magnet at left—U-shaped magnet at right.





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## from the Editor's Mail

### Reprints needed for classes

Gentlemen: I have been most interested in recent issues of "Finish" (*now MPM*) which have been loaned to me. Since we have not yet received any of the issues on our new subscription, would it be possible to secure reprints of the following articles:

"That New Electronic Surface Control Unit" Calvin J. Holtkamp, Dec. 1956."

"New Surface Unit has Selective Control for all cooking Temp." George Whinery, Jan. 1957

These will be used as we study ranges in one of my equipment classes.

Clarice Bloom  
Household Equipment Div.  
The Ohio State University  
Columbus 10, Ohio

Ed. Note: The reprints are on their way. We have checked on your subscription and you will be receiving future issues regularly. We hope you will continue to find material of use in your equipment classes.

### Values MPM information

Gentlemen: We are expanding completely our foreign operations and setting up several new installations in South America in addition to those that we already have. We would appreciate very much if you saw fit to place the writer's name on your mailing list for your magazine. We are very sure that the material and information will prove of tremendous value in our production and capital equipment facilities program.

Henry Boler  
Coordinator of Foreign Operations  
John Oster Manufacturing Co.  
Milwaukee 17, Wis.

Ed. Note: We certainly want to thank you for your letter in which you explained your expanding operations and your desire to receive our publication. We are pleased to learn of your interest and are happy to add your name to our controlled circulation list.

### Becomes regular subscriber

Gentlemen: The writer has been in the Paint Industry for over twenty years and, at present, is associated with Mirawal Division of Birdsboro Steel Foundry & Machine Co. We would appreciate receiving a copy of the December issue of your magazine, and a copy of the January issue. Please add our name to your mailing list to receive your magazine monthly. If there is a charge for handling the December and January issues, send same to this office. The writer has always found your magazine

to be of helpful interest in keeping up with the industry's latest developments and products.

George W. Hargest  
Mirawal Division  
Birdsboro Steel Foundry & Machine Co.  
Baltimore 12, Md.

Ed. Note: Your name has been added to our circulation list to receive the publication regularly. Copies of the December and January issues are on the way.

### Wants reprint

Gentlemen: Will you kindly provide this office with one copy of article entitled "Formability of Metals," which appeared in the October, 1956 issue. . . Thank you for your courtesies.

Robert W. Hussa  
Supervisor, Metallics Section  
Republic Aviation Corp.  
Farmingdale, L. I., New York

Ed. Note: A copy of the article entitled "Formability of Metals" is on the way. These reprints are available in quantity at a small cost of 25¢ per copy.

### Desires January issue

Gentlemen: We are interested in obtaining the January issue of the magazine *finish* (*now MPM*). Would you please advise whether we may obtain this magazine in Cleveland, or whether you would prefer to forward this issue direct.

W. R. Mogg  
Sales Manager, Special Products  
The Cleveland Graphite Bronze Co.  
Cleveland, Ohio

Ed. Note: We are pleased to learn of your interest in our publication. We are sending the requested copy at once, and if we may be of further service, please be sure to let us know.

### Who's who in enameling

On page 62 of the January, 1957 issue of this publication, a photograph used in connection with the story on the program of the Midwest Enamellers Club meeting showed Otto Novey of Chicago Pottery Co. in a group picture of program participants. Inadvertently, the name of Arthur Lander, Lawndale Enameling, was used in the caption.



NOVEY



LANDER

While we are sure that this error should be evident to enamellers throughout the Midwest District, due to the active part that both men have taken in Club activities, and as a result of their long connections with local enamellers, our news editor wishes to rectify the error through the publication of the accompanying photographs.



## Editor's Mail (Continued)

### Finds MPM informative

Gentlemen: I would be very interested and appreciative in receiving your magazine. Formerly, I was able to borrow and share copies with other management personnel here at Columbus Westinghouse. . . My position is Quality Control Supervisor for Dishwashers and the new Wash-N-Dry Combination. Your article for the Home Laundry Appliance Industry was particularly interesting.

Bryce Richard  
Electric Appliance Division  
Westinghouse Electric Corp.  
Columbus, Ohio

Ed. Note: Thanks for your letter. We are pleased to learn of your interest in our publication, and will be happy to see that your name is added to our controlled circulation list for METAL PRODUCTS MANUFACTURING (formerly, and including, *finish*).

### Breckenridge in California

I am enclosing the form for your circulation department and I will appreciate receiving *finish*, (now MPM) since past experience indicates that many of the articles are very informative and timely. May I take this opportunity to extend a most cordial invitation to visit us when you are in the vicinity of Los Angeles. . .

Frank Breckenridge,  
General Manager  
O'Keefe & Merritt Co.  
3700 East Olympic Boulevard  
Los Angeles 23, California

Ed. note: Mr. Breckenridge was formerly president and general manager of Automatic Washer Co., Newton, Iowa. We plan to accept that plant invitation.

### Wants reprints

Gentlemen: We wish to acknowledge your letter of December 18th, and to thank you for the excellent write-up you gave us in the December issue of your magazine.

We would like to purchase, if possible, 500 reprints of this article with the front page a reprint of your cover.

We also recently subscribed to your magazine, as we recognize it as the foremost one in the United States for the latest developments in the appliance field.

J. B. Coulson  
Traffic Manager  
Livingston Wood Manufacturing, Ltd.  
Tillsonburg, Ontario, Canada

Ed. Note: The article referred to is "Canadians Showing Interest in Safe Transit," a story about the new Safe Transit Testing Laboratory opened recently by the company in Tillsonburg.

### Add another reader

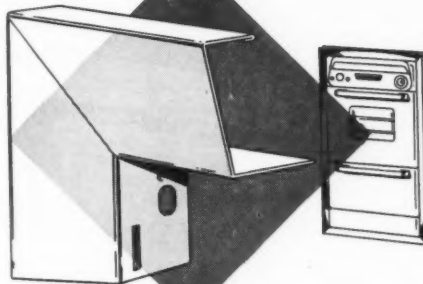
Gentlemen: Mr. C. E. Meyer, vice president of our firm, has expressed an interest in MPM. I asked if he would

to Page 98 →

Actual case histories  
of unusual design problems  
solved by  
Pyramid Mouldings

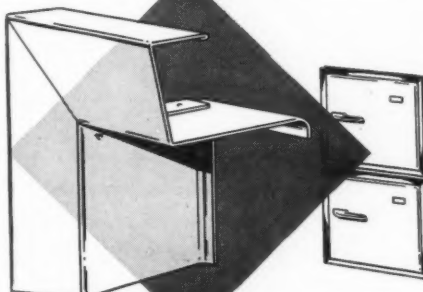
# Pyramid Mouldings

## Design Clinic



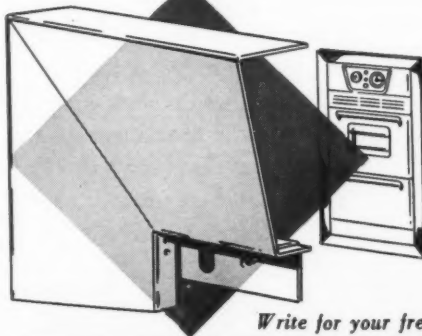
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<b>STAINLESS STEEL</b>	<p><b>DESCALING:</b> Process for completely removing heat scale from various alloys (including 17-7 PH).</p> <p><b>COATING:</b> Easily removable coating to protect stainless steel against tightly adhering scale up to 1600° F. during hot forming or heat treating.</p>
<b>MAGNESIUM</b>	<p><b>DESCALING:</b> Non-electrolytic alkaline process for removing previous chrome pickle films as well as oily substances often found on magnesium.</p> <p><b>COATING:</b> One-package powdered product which, when in solution with water, replaces Dow #17 treatment. Requires no mixing of chemicals. Eliminates chance of human error.</p> <p><b>PROTECTION:</b> Single-package touch-up liquid to produce coatings equal to Dow #18 treatment.</p> <p>(Note: All magnesium processes mentioned above are approved for use by Magnesium Department, Dow Chemical Co.)</p>

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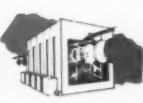
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TITLE \_\_\_\_\_



# A method of determining the sag resistance of porcelain enameling steels

a review article on an investigation of five methods for supporting specimens, and the equipment and methods for conducting steel sag tests

by H. L. Conaway • APPLIED RESEARCH LABORATORY, U. S. STEEL CORPORATION

WHEN sag tests are made on a given lot of steel by the procedure proposed in Porcelain Enamel Institute Bulletin T-4, the results are not so reproducible as desired. Therefore, we undertook an investigation to find a better method of determining the sag resistance of enameling steels. In this investigation, we designed and tested four new methods of supporting specimens during a sag test and compared the results obtained with each of these four methods with those obtained with

the method proposed in Bulletin T-4.

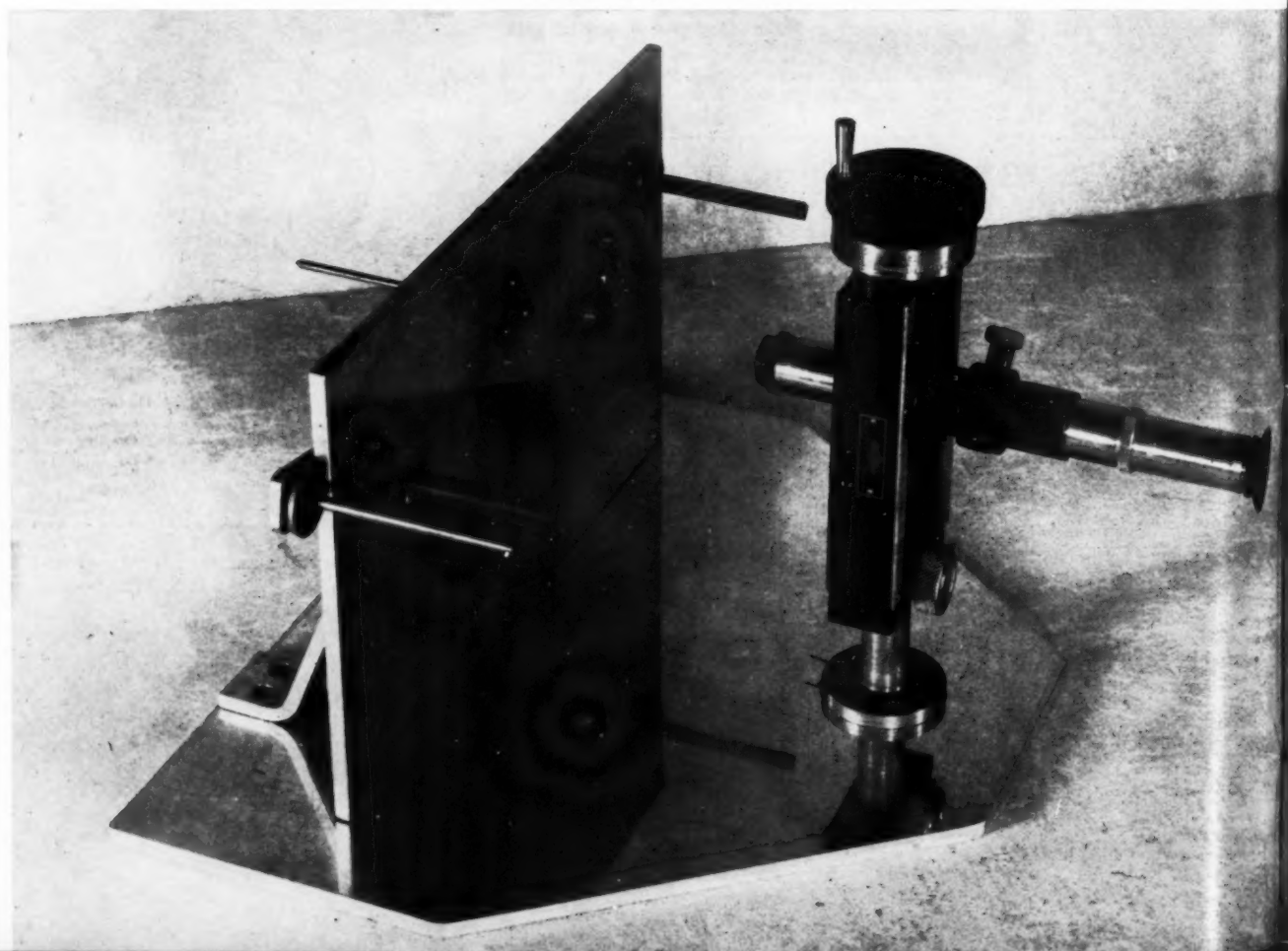
In our studies we annealed all the specimens in a dried nitrogen atmosphere to eliminate residual stresses resulting from mill processing so that the distortion that occurred during the test would represent the sag characteristics of the steel and not a combination of sag and warpage. Also, the sag tests were made on unenameled specimens rather than on bisque-coated specimens as prescribed in Bulletin T-4, because the use of unenameled specimens elimi-

nated the complicating enamel influence.

Figure 1 illustrates the five methods of support that were investigated: namely, two fixed bars, one fixed bar and one vertical trapeze, two vertical trapezes, two trapezes suspended in the form of an inverted V, and a cantilever.

Figure 2 shows the firing rack with the two vertical trapezes attached. The rack is made of  $\frac{1}{4}$ -inch diameter stainless-steel rod and was designed so that the various supports could be attached to it. Note the pins that maintain the

FIGURE 3 shows equipment used in making the sag readings. To determine the amount of sag, specimens are supported on the two parallel, horizontal, knife-edge bars. All measurements are made with the micrometer-slide comparator shown in the photograph.





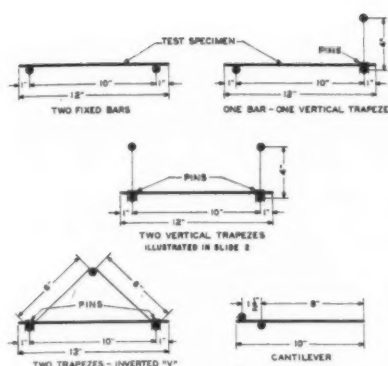


FIGURE 1. Schematic Diagram showing the different methods of supporting the specimens.

supports in the desired position but which do not rigidly fasten the specimen to the supports.

Figure 3 shows the equipment used in making the sag readings. To determine the amount of sag, specimens are supported before and after firing on the two parallel, horizontal, knife-edge bars spaced 10 inches apart. All measurements are made with the micrometer-slide comparator shown in the photo.

Figure 4 shows the sag values obtained at the indicated temperatures for an enameling steel and for a cold-rolled steel when two fixed bars, one bar and one vertical trapeze and two vertical trapezes were used to support the specimens. The other two methods of support—the inverted V trapeze and the cantilever—are not shown because in one instance, consistent sag values were not obtained and in the other, the sagging was confined to a narrow section of the specimen.

Note that the lowest sag values were obtained with the two fixed bars and that the sag values obtained with two vertical trapezes and with one bar and one vertical trapeze are almost the same. Also note that the sag values for both steels are about the same at 1300 Fahrenheit but differ greatly at 1600.

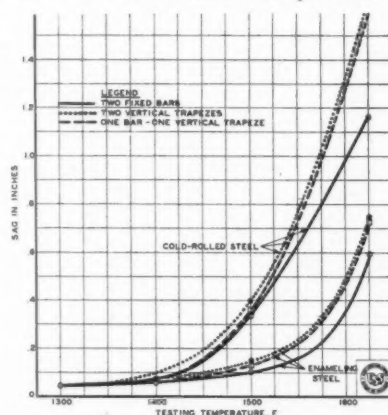
To make a further discrimination among the first three methods, standard-deviation values were calculated. Figure 5 shows the standard-deviation of the sag values obtained for the enameling steel at various temperatures in the range 1300 to 1600 F. Note that the values obtained with the one bar and one trapeze and with the two vertical

Standard-Deviation Values for Enameling Steel in Inches

TYPE OF SUPPORT	TEMPERATURE, F			
	1300	1400	1500	1600
TWO FIXED BARS	0.002	0.004	0.008	0.077
ONE BAR - ONE VERTICAL TRAPEZE	0.004	0.002	0.006	0.036
TWO VERTICAL TRAPEZES	0.001	0.003	0.002	0.046

FIGURE 5. Standard-Deviation values for enameling steel, shown in inches, in heat range of 1300 to 1600° F. Five types of supporting members were employed in the sag tests.

FIGURE 4 shows the sag values obtained at the indicated temperatures.



trapezes are lower than those obtained with the two fixed bars.

Of the five methods investigated for supporting specimens in the sag test, the two-vertical-trapeze method appears to be the best for the following reasons. First, good reproducibility of test results are obtained. Second, sag is not restricted by the supports. Third, sag occurs over the entire specimen length between the supports. Fourth, the specimens will not slip off the supports when large amounts of sag occur.

Annealing specimens prior to sag testing and testing the annealed specimens in the unenameled condition are desirable procedures in studies of the sag characteristics of enameling steels.

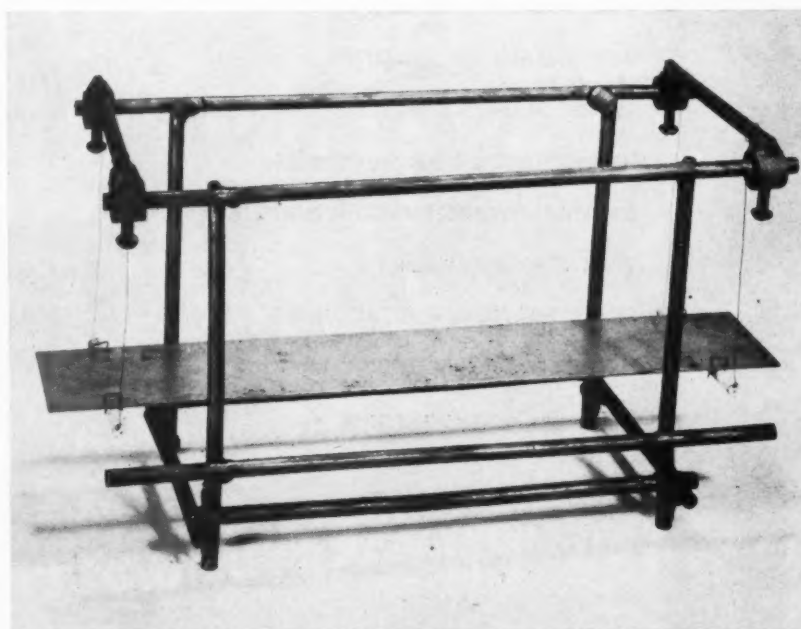


FIGURE 2. Two-vertical-trapeze testing unit gives good reproducibility of test results, and sag is not restricted by the supports.

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# The role of oxygen in iron-enamel adherence

evidence indicates interface roughness does not completely account for porcelain enamel adherence—work is needed to isolate other mechanisms in vitreous coating adherence

VITREOUS enamels have long been used on metals to provide protection against corrosion at both normal and elevated temperatures, and also to provide a decorative finish. Scientists believe that oxygen in the firing atmosphere plays a role in the adherence of such vitreous coatings to the metal. To obtain detailed information about the adherence mechanism, the National Bureau of Standards conducted a series of experiments in which the oxygen content of the furnace atmosphere was varied when the same enamel containing varying amounts of an adherence promoter, cobalt oxide, was fired onto iron.

Results reveal that, for optimum adherence, any decrease of oxygen in the furnace atmosphere requires a corresponding increase in the amount of cobalt oxide in the enamel. Enamels containing 3.2 weight per cent, or more, of cobalt oxide, develop a weak but definite bond in furnace oxygen concentrations as low as 0.02 mole per cent, but when smaller amounts of cobalt oxide are present, a greater oxygen content of the furnace atmosphere is necessary for appreciable bond development.

The study, which was carried out for the National Advisory Committee for Aeronautics by A. G. Eubanks and D. G. Moore of the Bureau's enameled metals laboratory, is one of a series of investigations at NBS aimed at obtaining a better understanding of the ceramic to metal bonding mechanism.

## Controlled atmosphere furnace

The equipment used at the Bureau to study the effect of oxygen consisted essentially of an air-tight inductively heated furnace into which metered quantities of oxygen and nitrogen could be admitted at known pressures. The specimens were fired inside the muffle at 1550° F. for a predetermined period. The specimen blanks were of ingot iron, 4 by 4 by 0.047 in., pickled, and then coated with the enamel composition.

The enamels contained varying quantities of cobalt oxide or cobalt oxide with manganese oxide, and were pre-

pared according to standard procedures. Adherence of the fired enamel to the specimen was evaluated with the Porcelain Enamel Institute adherence meter. When used according to the ASTM test procedure, this instrument establishes the fraction of the test area to which

**Table 2**  
**Mill Batch for Preparing**  
**Ground-Coat Slips**

(Milling time, 3 hr; fineness, 10 g on 200 mesh from 50 ml of slip)

Material	Weight, g
Frit	1,000
Enameler's clay	60
Borax	10
Water	425

**Table 1**  
**Basic Composition of Frit**  
**for Preparing Ground Coats**

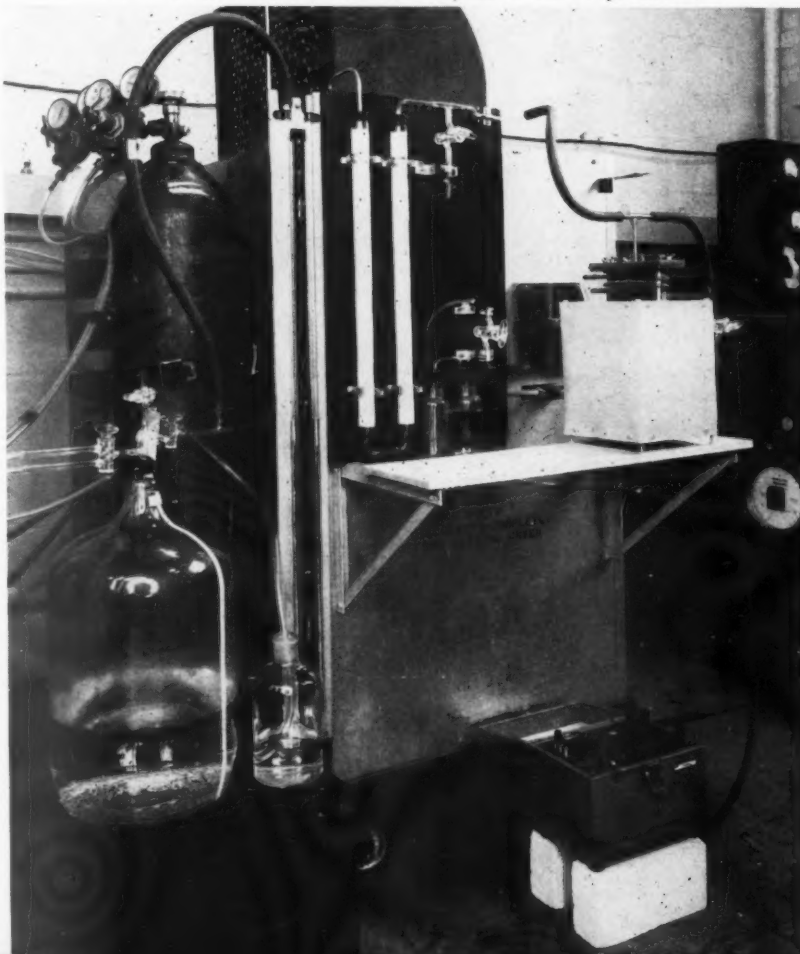
(a) Batch composition

Material	Parts by weight
Potash feldspar	30.82
Borax (hydrated)	44.25
Flint	30.50
Soda ash	9.16
Soda niter	5.15
Fluorspar	8.30
	128.18

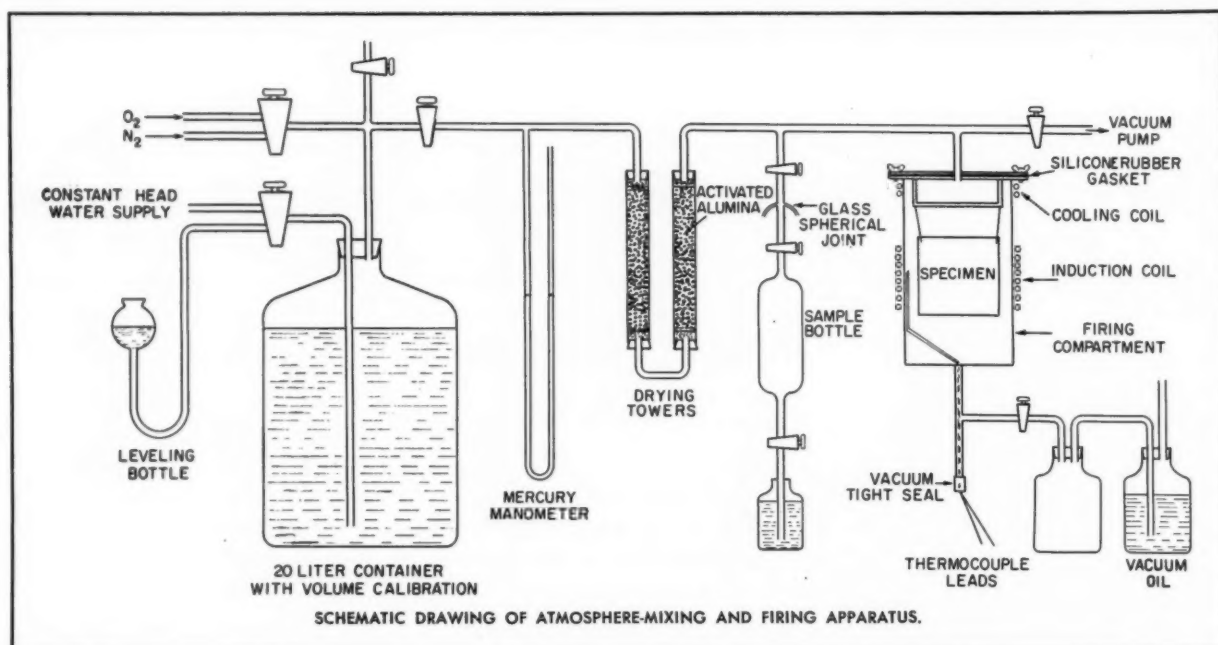
(b) Computed oxide composition

Oxide	Percent by weight
SiO <sub>2</sub>	51.0
B <sub>2</sub> O <sub>3</sub>	16.1
Al <sub>2</sub> O <sub>3</sub>	5.7
Na <sub>2</sub> O	15.4
K <sub>2</sub> O	3.5
CaF <sub>2</sub>	8.3
	100.0

*Atmosphere-mixing and firing apparatus used at the National Bureau of Standards to investigate the role that the oxygen plays in the adherence of vitreous coatings to metal. With this apparatus, the oxygen content of the firing atmosphere can be varied when various enamels are fired onto iron specimens.*







the coating continues to adhere after the specimen has been deformed in the prescribed manner.

A coating containing 0.4 percent cobalt oxide developed its best adherence at an oxygen content of 20 mole per cent — approximately that of air — while enamels with higher cobalt oxide contents reached their peak adherences at about 5 mole per cent of oxygen. It was observed that enamels with larger amounts of adherence oxides do not require as much oxygen in the furnace atmosphere as those with smaller amounts; this observation indicates that

oxygen can be supplied by enamel itself.

The conclusion here is that the cobalt oxide is in some way supplying or facilitating the supply of some of the oxygen, since the amount of cobalt oxide is the only difference between the coatings. This conclusion is substantiated when the amount of cobalt oxide is plotted against adherence index for specimens fired in low oxygen concentrations. When the curves are extrapolated, they pass through the origin, thus indicating that cobalt oxide-free coatings have an adherence index of zero. With increasing cobalt oxide,

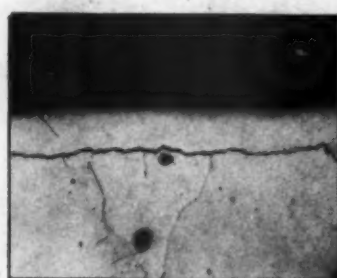
however, adherence index increases accordingly.

#### Roughness of interface

Metallographic sections were prepared of representative specimens. These showed that the adherence increased with increasing roughness of interface between enamel and iron. Earlier investigations at NBS have shown this same type of roughness-adherence correlation. The roughening of the metal has been shown to occur during firing by what is believed to be a galvanic corrosion mechanism. to Page 87 →

Micrographs of coated iron specimens showing effect of oxygen content of furnace atmosphere on surface roughness for a coating containing 0.4 per cent cobalt by weight. The coating on the specimen was fired in atmosphere with

0.8 mole per cent oxygen flaked from metal during cutting operations, and the section was subsequently nickel plated to preserve the interface. Magnification for the specimens was  $\times 900$ , unetched.



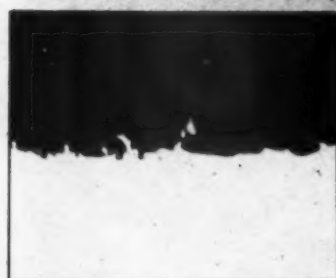
0.8%  $O_2$   
Adh. Index- 2.1



5.2%  $O_2$   
Adh. Index- 21.0



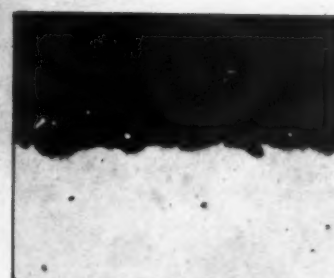
20.0%  $O_2$   
Adh. Index- 65.0



41.2%  $O_2$   
Adh. Index- 54.2



60.0%  $O_2$   
Adh. Index- 56.2



99.1%  $O_2$   
Adh. Index- 58.6

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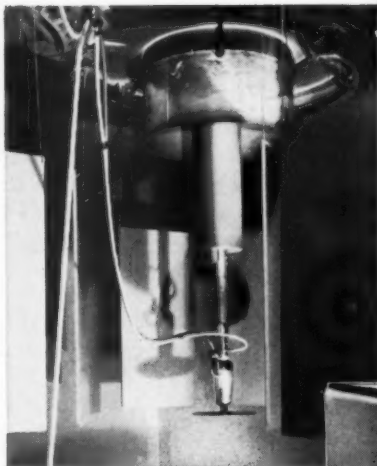
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## The importance of water treatment in porcelain enameling plants

a Dictet report to the Editor of MPM

by James Willis • SERVICE MANAGER, PEMCO CORPORATION



the ground coat was astounding. It would not even be recognized as the same material and the results obtained with this material in production were considerably inferior to the results obtained when using treated water.

There is also a good bit of evidence accumulating to indicate that the use of treated water in makeup of the pickle room solutions has considerable value. I refer to such solutions as the neutralizer, the nickel solutions, and possibly the rinse waters following the acid and nickel solutions. The type of equipment involved in preparing water for this use need not be the two-stage system which

is normally used in preparing water for the milling of enamels. Just a single stage or zeolite softening plant is sufficient for this type of water treatment. The second stage in which all of the sodium ions are removed from the treated water is essential in the preparation of the water for milling enamels but is not required in the preparation of pickle room solutions.

The major effort in preparing steel for enameling is toward the production of a chemically-clean metal surface. The salts which are normally carried in raw waters are in direct opposition to this ultimate goal in the preparation of steel for enameling. Therefore, the elimination of these undesirable salts from the water, and consequently the elimination of carry out of such salts on the ware, should have the effect of helping to control the drain characteristics of the enamel on the steel when the ground coat is applied by dipping. It should also assist in the control of defects which are frequently attributed to deposits of foreign substances on the surface of the metal, such as copperheads and blisters, and possibly boiling type conditions.

THE use of demineralizers in the preparation of water for milling porcelain enamels is not getting the widespread acceptance in the enameling industry which it rightly deserves. There have been many installations of this type of equipment in which management has realized the value of the equipment and no doubt the value has been proved by actual production service. However, there has been little written or published, at least on the benefits that were derived from the use of this equipment. In my opinion, there is a considerable amount to be gained in the normal production results in any plant through the use of treated water in the milling of enamels.

As an example of the improvement that can be realized through the use of equipment of this type, at one time I was in a plant in which demineralizing equipment was used to prepare the water for enameling and in general excellent results were being obtained. One day during one of my visits in this plant the demineralizing equipment was out of commission and it was necessary to use raw water in milling the ground coat enamels for the plant; the difference in behavior and appearance of



A NEW MPM SERVICE is represented by this photograph, and by the short feature on this page by James Willis. The photo shows the Dictet (portable, battery operated Dictaphone) in use to get "on the spot" information. Here, the Dictet is recording words of wisdom from Prof. A. I. Andrews of the University of Illinois (Technical Consultant for MPM). At left is Dana Chase, MPM editor, and at the right is R. J. Baker, Frigidaire Division, GMC. In addition to the comprehensive plant features carried regularly in MPM, publication editors will be calling on key men throughout the Appliance and Fabricated Metal Products Industry, with Dictet and camera, to record spot information and news.



For more information regarding the new Cadalume process, write to Dept. MPM, Hanson-Van Winkle-Munning Co., Church St., Matawan, N. J., or to Special Projects Editor at METAL PRODUCTS MANUFACTURING.

**CADALUME FINISHING** of a radio chassis is studied in the Matawan laboratory by two H-VW-M personnel. Advantages reported for the new cadmium process include increased brightness and faster plating speeds.

## New cadmium plating process for lustrous bright deposits

A NEW cadmium plating process that produces lustrous bright deposits with exceptionally low brightener consumption was announced recently by Hanson-Van Winkle-Munning Co., a leading manufacturer of metal finishing equipment and supplies.

This improved "Cadalu" process increases brightness up to 10%, brightener-life 400%, and plating speeds up 10%, an H-VW-M official states. For many applications a subsequent bright dip operation is considered necessary.

The new process uses two brighteners. One is the Make-Up Brightener and is used only when making up a new bath or converting an existing one. The other, called Cadalu Brightener, is used for all maintenance additions.

Results in both rack and barrel plating are reported. In lab and field tests, the new bath has shown a wide tolerance to impurities, improved deposit distribution, and has proved simple to control and easy to operate.

The process is used to protect iron and steel parts against corrosion, and non-ferrous metals against surface tarnish, corrosion or galvanic couples formed in assemblies.

The new bath is a clear solution. Unlined steel tanks have proved satisfac-

tory but lined steel tanks can also be used, with current directed to the work for greater certainty of optimum metal distribution.

It is reported that most conventional cadmium solutions, or an existing bright cadmium bath, can be converted to the new process by simply adjusting the solution to the recommended formula, then adding the required amount of make-up brightener. However, it is suggested that a sample solution be sent to the supplier's laboratory for conversion recommendations.

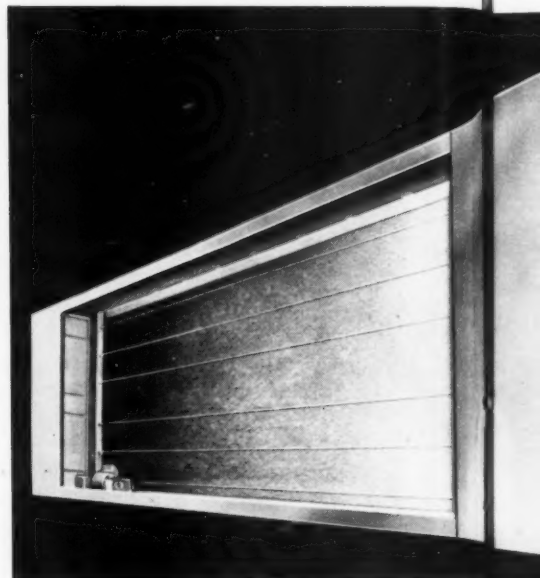
Recommended formula for making up a new bath or converting an existing one:

Formula	For 100 Gal.
Cadmium oxide	22 lbs.
Sodium cyanide	94 lbs.
Cadalume Make-Up Brightener	1 gal.

Optimum  
3.5 oz./gal.  
15.0 oz./gal.  
1.28 fl. oz./gal.

### Operating Conditions

Cadmium as metal	3.0 - 4.0 oz./gal.
Temperature	85° - 95° F.
Current density	10 - 60 asf
Voltage	3 - 4 volts



## Automatic air filtration adapted to a

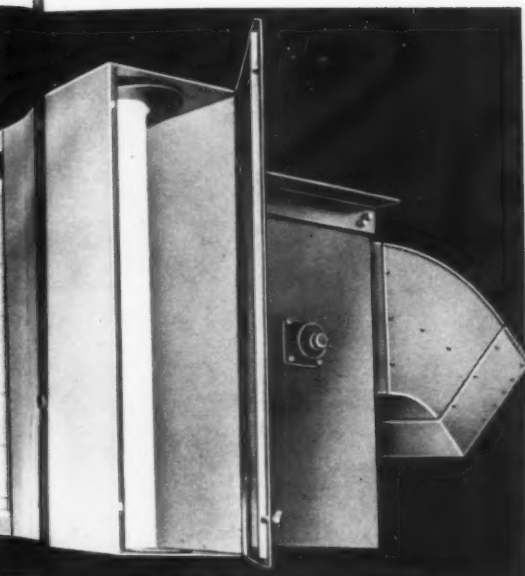
AUTOMATIC air filtration and 'once a year maintenance' for air handling units has been introduced in American Air Filter Company's new "Roll-O-Vent" line of industrial unit heaters, heating and ventilating units, and air conditioners.

Automatic filtration is accomplished in the units by use of a continuous glass fiber curtain that moves horizontally through the entering air stream of the unit just ahead of the coils and fan sections. Fresh media is automatically supplied to the air stream by an automatic timer to provide constant filtering and automatic disposal of contaminated media.

### Reduced maintenance

Frequent maintenance and replacement of filter media is said to be virtually eliminated by the new method. Under normal operating conditions, the media would need replacing only once a year. Renewal is accomplished by

## Interesting Industry Developments



### pted to air handling units

removing the spool of used media and replacing it with a new spool of clean material.

The density of the media is graduated by both increasing the number and decreasing the diameter of the fibers from the front to the rear of the mat. This apportions the dust load through the depth of the mat for greater dust holding capacity.

The filtering media is composed of continuous, slightly curled, interlaced glass filaments. These are held in place

→  
**SIMPLE TOOLING** required for "Hydroforming" saves up to 95 percent of the cost of conventional tooling and parts can be formed from practically all sheet metals, according to Col. Herman E. Lacy, right. Here he inspects chocolate dispenser base drawn from an 18 inch aluminum blank of .50 gauge to a depth of 5½ inches. Luther Gordon, operator, feeds machine.

MPM MARCH • 1957

at every point of contact with a thermo-setting plastic bond to form a thick resilient pad or "blanket." These "blankets" are impregnated with a non-flammable, jell-like viscosine that is designed to operate at temperatures up to 150 degrees fahrenheit.

The basic unit consists of a fan section, a coil section and the automatic filter. Standard and non-freeze steam coils and various accessories such as

humidifiers, mixing dampers, face and by-pass dampers and intake dampers are available to adapt the units to field condition.

Further information is available on the "Roll-O-Vent" upon request, by writing to Dept. MPM, American Air Filter Co., Inc., 215 Central Avenue, Louisville 8, Kentucky, or to Special Projects Editor at METAL PRODUCTS MANUFACTURING.

## A versatile, low cost, custom deep-drawing process

**H**YDROFORMING is reported as a new and versatile custom deep drawing process that operates without conventional dies. "Low cost tools and quick set-up makes it a simple matter to produce a new or experimental part," Colonel Herman E. Lacy, president, Hydroforming Company of America, states. "A variety of materials of different gauges can be formed with equal ease using the same tooling."

Using only the male part of the die, the presses handle metals from .005 inch to 5/8 of an inch forming parts from blanks up to 23 inches in diameter. The Hydroform presses are capable of exerting pressure up to 15,000 pounds per square inch, and the metal blank is literally wrapped around the male punch to produce the desired part.

The new process is said to combine extreme precision in deep drawing, freedom of design, and fast delivery of parts. The process, Col. Lacy said, can produce almost any shape or contour

of part from virtually any ductile metal.

According to Col. Lacy, parts can be Hydroformed from practically all sheet metals: steel, aluminum, magnesium, copper, aluminized steel, brass and precious metals. Higher strength alloys and metals successfully formed include stainless steels, titanium, Nimonic 75, L-605, Inconel, stainless-clad copper, Hastelloy and others.

The process will provide a new, low-cost service that fills a definite gap in the metal working field, Col. Lacy pointed out. However, he added, Hydroforming will not compete with the tool and die industry, deep drawing industry, nor will it be a substitute for die casting where die casting is a practical and economical solution.

For further information, write to Dept. MPM, Hydroforming Company of America, 7400 West Lawrence Avenue, Chicago, Illinois, or Special Projects Editor, METAL PRODUCTS MANUFACTURING.





**IN EVERY WAY...**  
**Follansbee Means Quality**

**FINEST FINISH**

**GAUGE & WIDTH UNIFORMITY**

**ADHERENCE TO SPECIFICATIONS**

**SUPERIOR SERVICE**

**COLD ROLLED STRIP**

**by  
FOLLANSBEE**

Follansbee cold rolled strip is made to your exact specifications, has true gauge and width uniformity and the finest finish in the industry.

Follansbee's reputation for the finest cold rolled strip is a result of rigid quality control through every phase of production.

You'll like the service your Follansbee representative gives you. Call him the next time you are ready to order cold rolled strip.

**FOLLANSBEE**  
**STEEL CORPORATION**



**FOLLANSBEE, WEST VIRGINIA**

**Cold Rolled Strip • Seamless Terne Roll Roofing • Polished Blue Sheets and Coils**

*Sales Offices in Principal Cities*

INTERNATIONAL HARVESTER

## Heavy Equipment Completely Baked in 20 Minutes

SEE OUR CATALOG  
IN SWEET'S  
PLANT  
ENGINEERING  
FILE  
OR WRITE FOR COPY

These are the results which have made Burdett "Radiant-Heat" Systems the preferred paint drying method for all types of products from toys to heavy duty equipment like the crawler tractor equipment shown here.

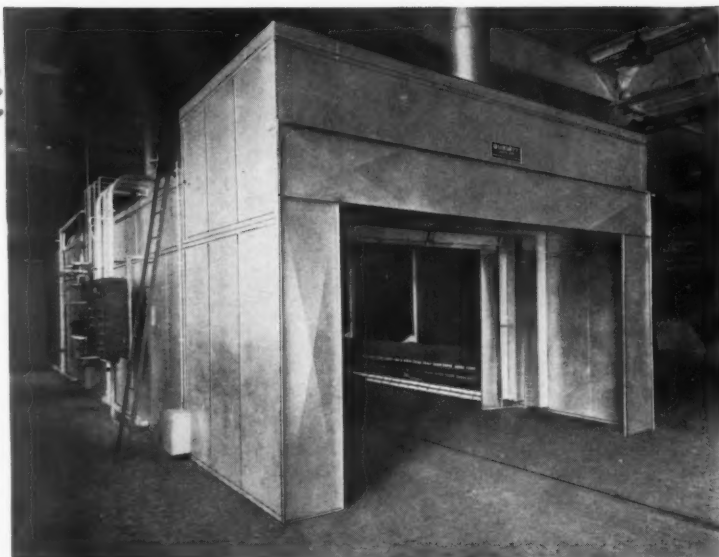
Burdett "Radiant-Heat" Ovens equipped with Model 10L Radi-Heat Line Burners are particularly suited for handling the tougher assignments, such as; tractors, bulldozers, earth movers, trucks, heavy welded fabricated parts, etc. with a remarkable saving in time and fuel, plus the assurance of a better finished product.

Here's why such speed is possible only because the radiant heat which is generated by the Burdett System reaches the metal work with virtually no loss. Baking of the enamel finish is accomplished by the combination of Radiant-Heat and controlled air recirculation. Control equipment for this oven has been specifically designed to meet International Harvester Company and JIC specifications.

Burdett No. 10L "Radi-Heat" Line Burners, as used here, satisfy unlimited applications with a new efficiency and lower cost. They have been known to cut fuel costs as much as 70%, as compared with conventional methods.

Let us send you detailed information on Burdett "Radiant-Heat" Ovens for your finishing department —to convert your existing oven—or for a complete new system.

We invite  
your inquiry  
for complete  
details



• This Burdett System is installed in the International Harvester Company Tractor Works. Enamel finishes are baked on the husky International equipment in 20 minutes time.



Write for the Burdett story!

WRITE FOR FULL INFORMATION WITHOUT DELAY

**BURDETT**  
MANUFACTURING COMPANY

4918 South Monitor Avenue, Chicago 38, Illinois

DETROIT

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NEW YORK

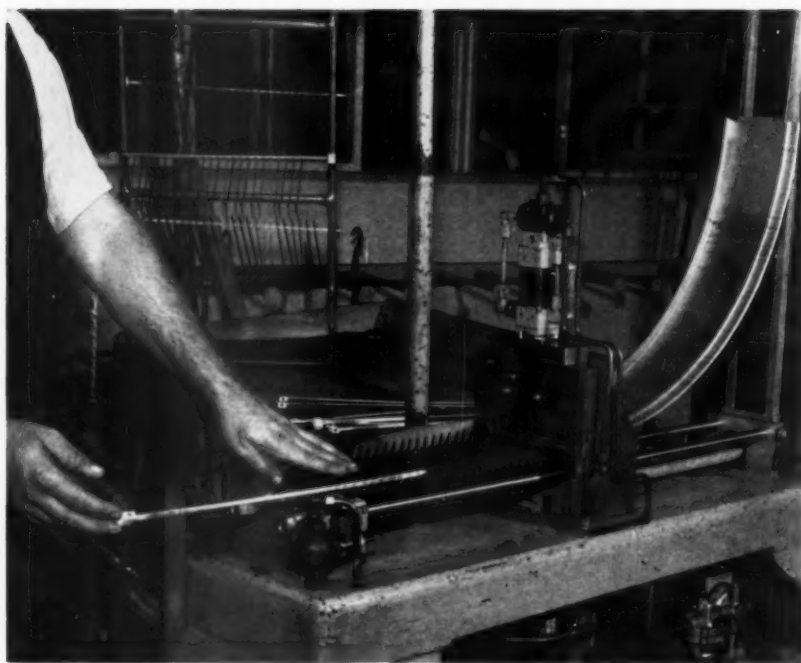
CLEVELAND

DALLAS

Manufacturers of  
COMPLETE FINISHING SYSTEMS — "RADIANT-HEAT" SYSTEMS, OVENS, HEATERS,  
AIR MAKE-UP UNITS, SPRAY BOOTHS AND WASHERS

# MPM Suggestion Box

## Simple air indexing device expedites loading of plating racks



*Fixture having a carriage that is air indexed and synchronizes with a gate to pick up typewriter key levers from a stack in the curved chute and deposit them in evenly spaced carriage slots. The stampings are lifted off by a plating rack bar that is passed through a hole in each piece.*

**K**EY levers for IBM typewriters are slender flat stampings that require plating. This work is done in the Poughkeepsie, N. Y. plant of International Business Machines Corporation. Plating requires racking. One rack appears in the background of the accompanying illustration.

Racking involves spacing the stampings evenly along copper bars that are later hung on the rack. Formerly, this racking was done by hand, one piece at a time. This was a slow and tedious job and was costly, as the volume of levers required is high. Now, the job is done much faster through the use of the simple air indexing fixture shown.

This fixture includes a curved track or chute on which the stampings are stacked in large numbers. At the lower end of the track is a vertical slide that is moved up and down by a double-acting plunger in an air cylinder. Below the chute is a light carriage having slots evenly spaced. This carriage is indexed along tiebar tracks.

Each time the slide is retracted, one stamping is released and drops into a slot of the carriage which then indexes to bring the next slot into loading position where it too is filled when the gate is lifted again. This cycle is repeated rapidly as long as a treadle holds an air valve open or until all slots of

the carriage are filled, which occurs at the end of the carriage travel.

When the carriage is filled, a full set of stampings are in place and the hole in each stamping is in line with that in each other stamping. Consequently, a rack bar can be passed quickly through all the holes. When this is done, the bar is lifted, while remaining in horizontal position, and lifts all the stampings from the carriage. They remain on the bar, equally spaced, while it is shifted and hung on the rack. Time required is a small fraction of that needed for hand loading and this saving soon paid for making the fixture. It can be used for other flat stampings if a suitable chute and a carriage suited to hold the parts are provided.

## PLUMBING FIXTURE MFRS. ASSN. ELECTS NEW OFFICERS

E. O. "King" Brady, general manager of the Plumbing Ware Division, Briggs Manufacturing Co., was installed as chairman of the Plumbing Fixture Manufacturers' Association during the February meeting of the PFMA membership in Chicago.

Brady has played a dominant role in the development of the plumbing fixture industry for many years. He was vice chairman of PFMA in 1955 and 1956, and was the first person to hold that title. He has served on a number of important committees of the association, including the executive, and statistics, committee.

From 1948 to 1954, he was active in the Vitreous China Plumbing Fixtures Association, one of two trade groups that merged in 1955 to form the PFMA. He was chairman of the VCPFA in 1951 and '52.

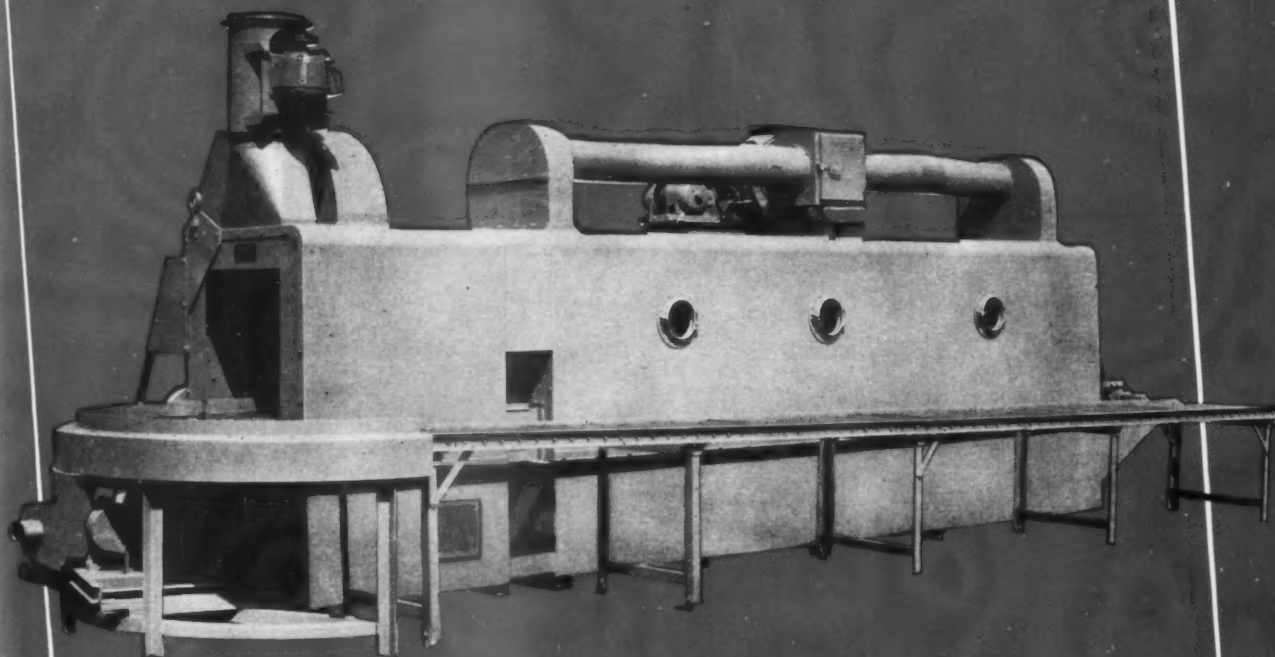
Officers elected with Brady are Stanley S. Backner, vice president of Universal-Rundle Corp., association vice chairman; and Laurence A. Drouhard, secretary of Mansfield Sanitary Pottery, Inc., association treasurer. Wm. E. Kramer is secretary of the association.

The beginnings of PFMA can be traced back to the formation of a small association of manufacturers 25 years ago. Today the association is reported to represent the producers of a majority of all the bathtubs, lavatories, and toilets made in the United States. The association works to establish sanitary standards for plumbing fixtures, and to tell the public how the industry is improving the health and comfort of the American family.





## ONE MAN OPERATION — POWER SPRAY WASHERS by PETERS-DALTON FOR CLEANING MISCELLANEOUS SMALL PARTS



To meet the needs of a major appliance manufacturer, PETERS-DALTON designed, engineered, built and installed the steam heated 3-stage Power Spray Washer shown above. It solved the problems met in this plant through the need for between-operation cleaning and paint preparation for small parts of varying sizes. This washer has a steam heated blow-off with an alkali cleaning stage, followed by two rinses. It is so designed and built that parts are placed on a 30" wide mesh belt and conveyed at speeds of 2' to 4' per minute through the cleaning cycles, and exit over a gravity return roller conveyor to the position for handling by only one man who performs both the loading and unloading operations.

Perhaps you have cleaning or paint preparation problems that could be met by a P-D Power Spray Washer such as the one above. If so, remember that with P-D every job is studied and handled as a "first." For more than a quarter century PETERS-DALTON has been designing, engineering, building and installing finishing equipment to meet almost every conceivable requirement.

Whatever your finishing problems, you can with assurance present your needs to us . . . just write, wire or phone. We'll be glad to tell you more.

Representatives in principal cities.

- Pd** Hydro-Whirl Paint Spray Booths
- Pd** Industrial Washing Equipment
- Pd** Drying and Baking Ovens
- Pd** Hydro-Whirl Dust Collecting Systems

A-3/57



**Peters-Dalton INC.**

A SUBSIDIARY OF DETROIT HARVESTER CO.  
17800 Ryan Road • Detroit 12, Michigan



## Plastisols as protective coatings

resistance to corrosive conditions and mechanical shock, and versatility in application methods lead to varied consumer and industrial uses

by *D. R. Meserve* • PRODUCT MANAGER—COATINGS, METAL & THERMIT CORPORATION

AS a class of low-cost protective coatings for metals, plastisols, since their introduction about ten years ago, have solved some tough corrosion and abrasion problems both for consumer and industrial applications. Plastisols are vinyl-based, heavy duty coatings with a 100 per cent solids content. They can be compounded to varying degrees of hardness to resist particular corrosive conditions, and to yield cured films from 0.003 to 3/16-inch thick. Color can be added when product appearance is a design factor.

Consumer applications include such items as: dishwashing racks, food racks, wire chair backs, display racks, freezer baskets, and fan housings. Industrial uses include: linings for tanks and containers, tumbling barrels and duct work, insulating handles for electrical tools, for sound deadening, and as a coating for forming dies.

*DEVELOPMENT of spray techniques and compounds has made it possible to coat very large electroplating tanks with plastisols. Techniques employ standard spraying equipment.*

### Seamless tank linings

Plastisols as liners for tanks and containers have replaced rubber and plastic sheets in some applications. Compounded for this purpose, the material forms a seamless, nonporous coating that is easy to apply, and stands up under harsh corrosive and mechanical conditions.

For example, an automotive manufacturer used the coating for its degreasing basket and reported no damage after three years of heavy use.

Another example of use is as a coating in tumbling barrels. Engineers in a metal working plant ran a tumbling barrel coated with plastisol during a

nine-month production test. The test report states that the coating proved more durable than equal thicknesses of rubber—yet cost only half as much to apply.

### For electroplating processes

Plastisols have found a place in electroplating work. Electroplaters have found that the coatings can save metal and plating solutions by preventing plating of the racks. They also are recommended for conserving power in the plating process.

### Corrosion resistance

Many applications of plastisols depend upon their superior resistance to corrosion. One plant, which found it necessary to repair exhaust ducts frequently because of entrained sulphuric acid, hydrogen sulphide and carbon disulphide fumes, eliminated this expense with



*PLASTISOLS are oven-baked at 350 degrees F. for about 20 minutes. Resins and plasticers fuse to form solid, resilient coating that will resist harsh corrosive and abrasive conditions.*

plastisols. A nonporous 1/16-inch coating on the inside of the ducts provided complete protection.

The coatings not only have good resistance to acids, but also to alkalis, salts, salt solutions, oxidizing agents, and many wetting agents. This broad chemical resistance has made them useful in process piping, tanks, and shipping containers.

Stamping and forming dies have also been coated with plastisols to avoid scratching the metal.

The coatings are also used as shock absorbing coatings on metals. Feeding hoppers, used for automatic feeding of small parts for sub-assemblies, are coated to provide protection for the surface finish of the small parts.

#### **Application methods**

Application methods for plastisol materials include: molding, knife-coating, roller-coating, troweling, caulking, flow-coating, dipping, and spraying.

Thick coatings can be applied by cold dipping. Coatings up to 1/4-inch can be applied in one dip if the metal is heated first. Several factors influence

the thickness of hot-dipped coatings: temperature of the metal, immersion time, mass and shape of the object, temperature of the plastisol, and the specific heat of the metal to be coated.

Hot and cold dipping have been the most common methods, but a new plastisol is said to permit spraying cold flat surfaces with a coating up to 25 mils. Pieces too large to dip can be spray-coated with a material of this type.

An even newer sprayable material can be sprayed in a single coat up to 50 to 60 mils thick. This is about three times as thick as spray-coatings with the earlier plastisols. Multiple coats may be used to obtain heavier protective films.

Electrostatic spraying of fabricated wire baskets, dishdrainer racks, display racks, and other wire goods has also proved practical with spraying materials and is more than twice as fast as conventional dip coating.

Regardless of methods of application, the coatings are baked at about 350° F. A primer is usually applied before the plastisol.



*SLIP-RESISTANT handle grips, made by the Coatings Engineering Company, South Natick, Mass., for floor polishing equipment, are produced from vinyl plastisol by the dipping process. The internal dimensions of each grip correspond exactly to the external dimensions of the fitted handle, insuring a tight vacuum fit without the use of bonding adhesives.*

**NEXT MONTH** — a second article on plastisols — Plastisol Coatings Protect Plant Equipment, by Gilbert C. Close, Western Ed., MPM.





***Chef-o-Matic***

## **SURFACE ELEMENT TEMPERATURE CONTROL**

### **IS BEST FOR YOU AND YOUR RANGE CUSTOMER**

When selecting the automatic surface element control for your electric range, consider these significant features of the King-Seeley system:

- Temperature control range—100°F to 450°F
- Infinite number of precision settings within the temperature range, on a linear scale, in either knob rotation direction
- Quick response and recovery, dependable repeatability
- Anticipating feature of proportioning control limits over-shooting
- Accurate control in the Warm, Boil and Fry ranges
- All electric units with wire connections only—no tubes or other mechanisms to fuss with
- All units completely interchangeable
- Controls any wattage up to 3000 watts
- Expensive dual wattage elements not necessary

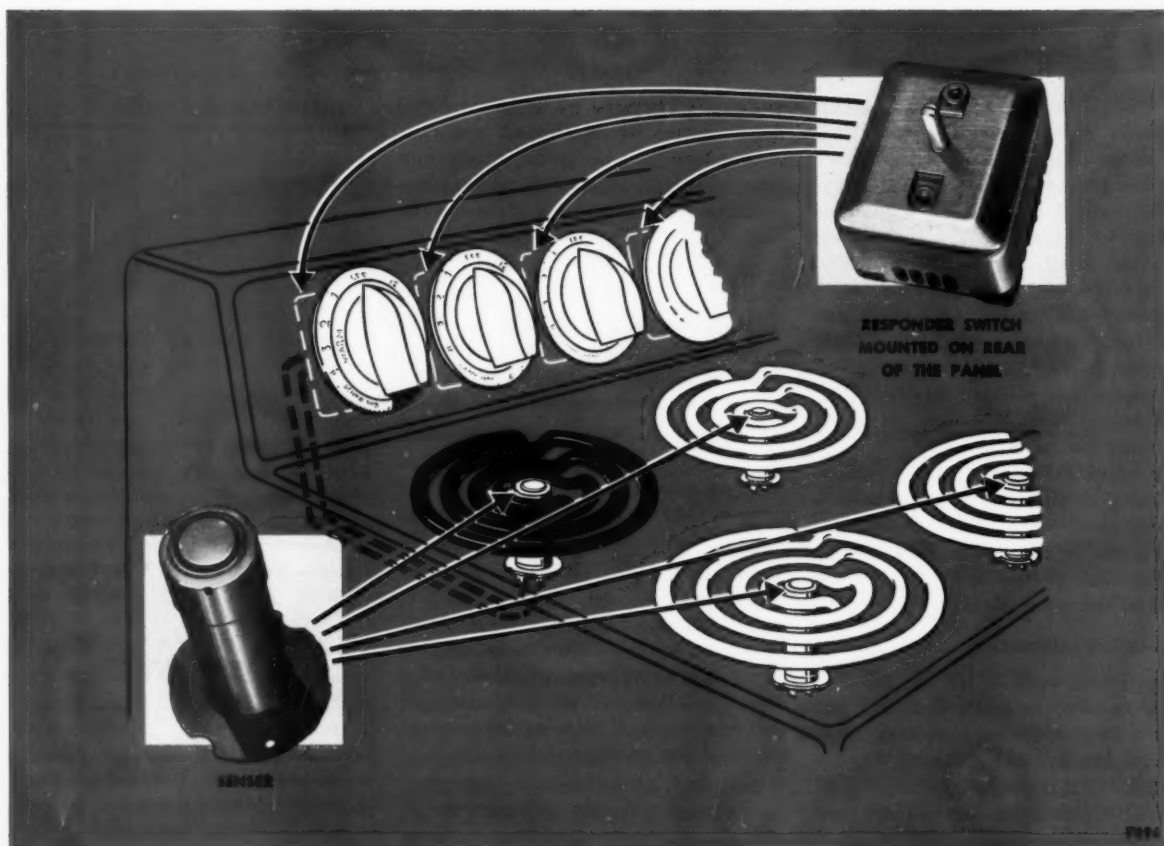
- User safety assured by low voltage system between sensor and responder switch
- Only one transformer for any number of surface units
- Automatically reduces wattage when cooking utensil is taken off surface element
- Rugged sensor—withstands up to 800°F
- Economical and easy to install

**MAKE YOUR OWN COMPARISONS  
OF PERFORMANCE, QUALITY AND  
COSTS. WRITE FOR COMPLETE  
SPECIFICATIONS.**



**KING-SEELEY  
CORPORATION**

**ANN ARBOR, MICHIGAN**



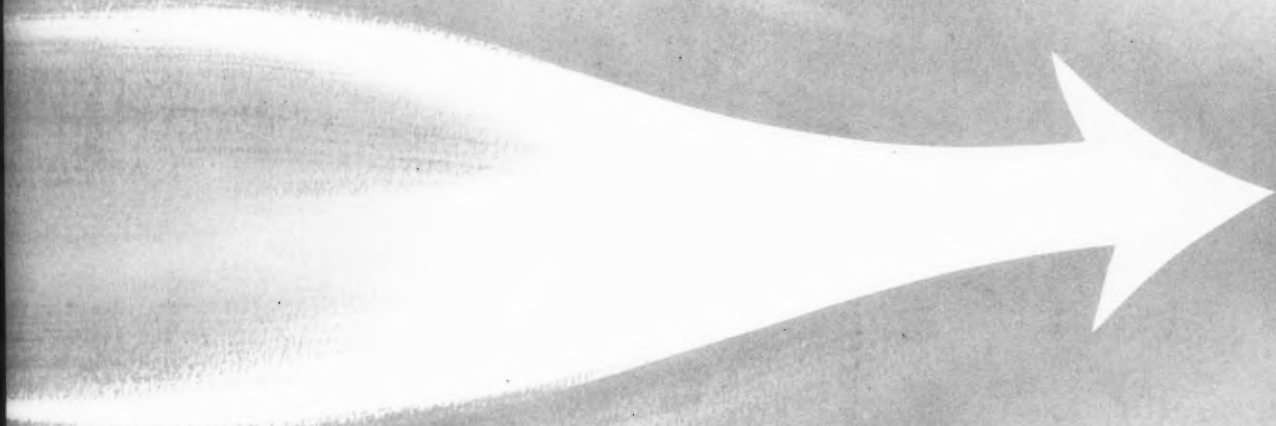






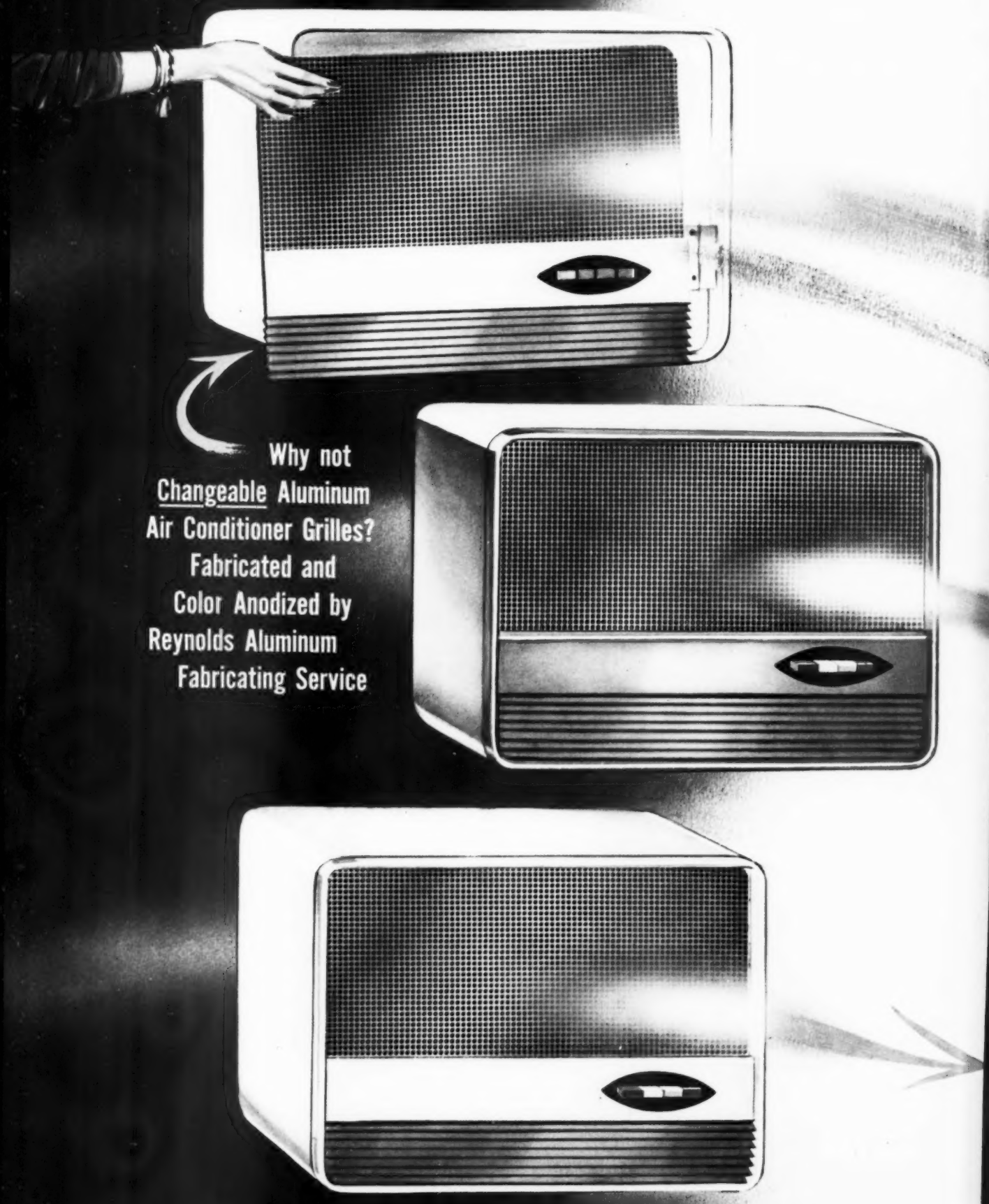
There's lasting beauty,  
quality and economy in

**ROOM  
AIR CONDITIONER  
PARTS**



fabricated and finished by

**REYNOLDS  
ALUMINUM FABRICATING  
SERVICE**

A black and white advertisement featuring three rectangular air conditioner grilles. The top grille is being touched by a hand with a bracelet. The middle grille is shown from a three-quarter perspective. The bottom grille is shown from a front-three-quarter perspective. A curved arrow points from the top grille towards the text. A straight arrow points from the bottom grille towards the right.

Why not  
Changeable Aluminum  
Air Conditioner Grilles?  
Fabricated and  
Color Anodized by  
Reynolds Aluminum  
Fabricating Service







A New Sales Idea . . .

A New Style Concept in  
ROOM AIR CONDITIONERS

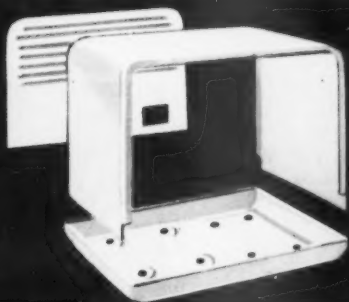
COLOR ANODIZED  
ALUMINUM GRILLES  
... changeable or permanent!

Now you can build the strongest feature story around beautiful grilles in colors that match or harmonize with finest room interiors. Rich golds, coppers, blues, greens and many other anodized colors give your designers new freedom . . . give your room air conditioners new sales appeal.

And imagine this! Reynolds makes it easy for you to offer a wide variety of *changeable* color anodized grilles. Perforated aluminum panels and extruded aluminum frames in matching or contrasting

colors—that's all it takes. This is like adding more models to your line—to your dealers' stocks—without actually producing additional models. The result? More flexibility per unit . . . more variety in your line . . . increased sales appeal . . . balanced dealer inventories . . . greater sales—all at a minimum cost!

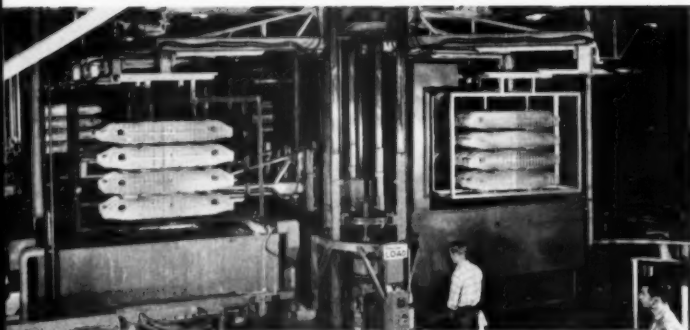
For grilles—both permanent or changeable—and for trim and cabinets, consider strong, lightweight, rustproof aluminum fabricated and color anodized by Reynolds.



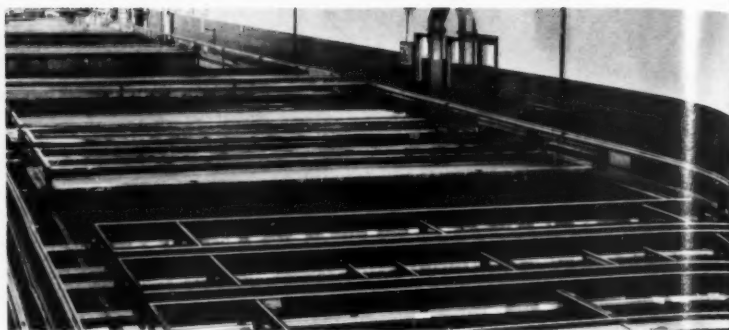
**ALUMINUM PROVIDES  
ALL-WEATHER PROTECTION  
TO EXPOSED PARTS**

Aluminum also does more than lend lasting beauty to room air conditioners. Aluminum's resistance to rust and corrosion assures all-weather protection to shells, frames and other parts exposed to elements outside the home . . . prevents unsightly streaking of sidewalls. Gives you another important sales feature.

Here's why it pays to rely on  
**REYNOLDS ALUMINUM FABRICATING SERVICE**  
for production of your  
Room Air Conditioner Parts.



This new Reynolds automatic aluminum finishing system can finish mixed sizes and types of appliance parts and chemically brighten or anodize them in different colors—and can handle several different jobs at the same time. An automatic coding system establishes the individual finishing specifications for each job.



This new Reynolds anodizing installation can handle parts ranging from small appliance trim parts up to parts 24' long, 12' high and 4' wide. This half-block long system is another new addition to Reynolds multi-million dollar finishing facilities investment.

**"On call"**  
to the Appliance Industry...  
**vast Reynolds fabricating**  
**and finishing facilities**  
to meet your needs

From start to "finish" on appliance parts and trim, Reynolds has more to offer. For example: *Vast fabricating facilities* with over 200 pieces of major production equipment in two plants alone plus finishing facilities unsurpassed anywhere. *Quality control* from mine to finished part. *Experienced design and engineering service.*

These Reynolds strong points add up to greater sales appeal, quality and economy for appliance manufacturers. Sales appeal with gleaming clear or color anodized and mechanical,

chemical and painted finishes. Quality stemming from quality control plus technological know-how in producing and fabricating aluminum. Economy because of the tremendous variety of most modern automatic fabricating and finishing equipment.

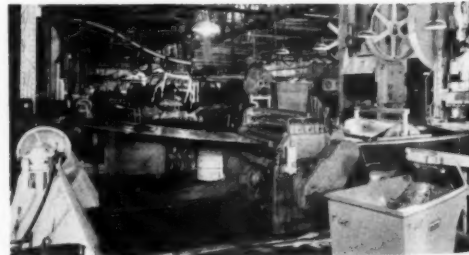
For full details on Reynolds fabricating and finishing facilities, contact your nearest Reynolds Branch Office or write *Reynolds Aluminum Fabricating Service, 2005 South Ninth Street, Louisville 1, Kentucky.*



Part of a battery of Reynolds new high speed buffing equipment used here on molding strips. Scratch-brushing, satin finishing, embossing and other mechanical finishes are also available.



Reynolds can paint entire parts a solid color, mask and paint or do paint filling in combination with mechanical finishing to supply most desired textures or highlighting effects.



Part of a battery of high speed coil fed presses at Reynolds producing at the high rate necessary to meet appliance industry requirements. All types of presses are available at Reynolds.



**REYNOLDS ALUMINUM**  
**FABRICATING SERVICE**

Blanking • Embossing • Stamping • Drawing • Riveting • Forming  
Roll Shaping • Tube Bending • Welding • Brazing • Finishing





## Industrial Literature

### BOOKLET ON NEW

#### PRE-FINISHED METAL

This booklet describes Bakekote, a new baked synthetic protective coating for pre-finished metals in copper and brass finishes. It is a slick, shiny, glossy film that can be worked within the limits of the fabricating properties of pre-finished metals. Bakekote-coated metals lend themselves readily to standard manufacturing processes with no fear that the coating will peel, crack, or flake. Dept. MPM, American Nickeloid Co., Peru, Illinois.

### STANDARD BLOWER HOUSINGS

If you are interested in a new source for standard blower housings, write for the DE-STA-CO blower housing brochure. Whether you are a large or small-volume user, you will want to have complete details. Dept. MPM, Detroit Stamping Co., 404 Midland Ave., Detroit 3, Michigan.

### HOW TO PREVENT IRON SPOTS

How to prevent iron spots in enamel cover coats with magnetic separators is the subject of a new bulletin. For complete information on this subject, send for bulletin 54-E. Dept. MPM, S. G. Frantz Co., Inc., P. O. Box 1138, Trenton 6, New Jersey.

### SNAP ACTION SWITCHES

This bulletin describes a line designed to provide rugged, dependable switches for a broad range of snap action switch applications. Some of the switches' features are: instantaneous, positive make and break action, high contact pressure, nonsensitive to vibration and shock, and stable under momentary high overload. Write for bulletin SNAPAC SL-3. Dept. MPM, Soreng Div., Controls Co. of America, 9559 Soreng Ave., Schiller Park, Illinois.

### STRAPPING MACHINE

#### DESCRIBED IN NEW FOLDER

The F3 Strapping Machine, designed specifically for applications where compressible or solid units must be strapped quickly and economically, mechanizes operations that formerly required physical effort. It fits readily into existing conveyor lines, and with push-button

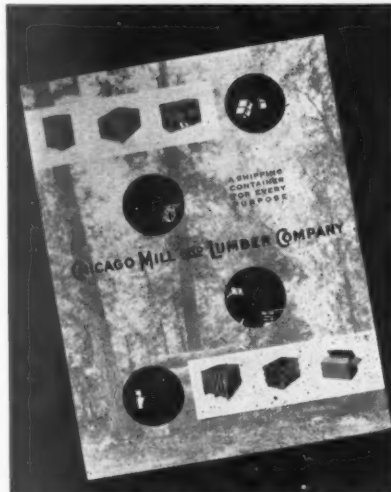
control, it moderately compresses, then tensions, seals and cuts one, two, or three straps simultaneously. Dept. MPM, Acme Steel Products Div., Acme Steel Co., 135th and Perry Ave., Chicago 27, Illinois.

### BULLETIN ON THERMOSTATS

A new bulletin describing a line of Stemco Type C thermostats has been announced. Both hermetically sealed and semi-enclosed types are covered. Punched for insertion in standard three-ring binders, the bulletin describes operating principles, gives dimensional data, ratings, materials of construction, etc. Available terminal and mounting arrangements are illustrated with photographs. Write for bulletin 5000. Dept. MPM, Stevens Mfg. Co., Inc., Lexington, Ohio.

### A SHIPPING CONTAINER

#### FOR EVERY PURPOSE



An illustrated catalog entitled "A shipping container for every purpose" shows the various types and applications of containers produced by this company. Write for your copy. Dept. MPM, Chicago Mill & Lumber Co., 33 S. Clark St., Chicago 3, Illinois.

### MANUAL SPRAY GUN CATALOG

This 12-page catalog describes and illustrates a complete line of manual spray guns and other manual air finishing equipment. Ask for catalog 2, Dept. MPM, Paasche Airbrush Co., 1909 W. Diversey Parkway, Chicago 14, Ill.

### QUICK GUIDE TO SPRING DESIGN

The fundamentals of spring design—presented in quick, easy-to-grasp form, and in sufficient detail to guide the product designer through the initial stages of a spring design problem—are set forth in a new 8-page brochure: "Spring Design and Selection—In Brief." The brochure contains the basic stress and deflection formulas, the commonly used spring materials, typical applications, and certain limitations for each of the various types of springs. Dept. MPM, Associated Spring Corp., Bristol, Conn.

### METHODS, APPLICATIONS OF VINYL METAL LAMINATES

A brochure on metal laminates called "Col-O-Vin Meets Metal," which spells out the story in plain and simple language of the processing and end products which can be manufactured of vinyl laminated to metals, is available. Graphic illustrations, comparative charts, and product pictures outline its potentialities. The material is currently being used for such products as: auto parts, typewriter and business machine cases, and air conditioner, radio, and TV cases. Dept. MPM, Columbus Coated Fabrics Corp., 33 N. Grant Ave., Columbus 15, Ohio.

### NEW TECHNICAL BULLETINS

#### ON RESISTANCE WELDING

The Welding Practices Sub-Committee of the Resistance Welder Manufacturers' Association has recently published bulletins on resistance welding. "Spot Welding of Magnesium with Three-Phase Low Frequency Equipment" has been designated bulletin 22 of the RWMA series. Bulletin 23 is "Seam Welding Low-Carbon Steel" and "Seam Welding Dissimilar Thickness of Low-Carbon Steel." These together with the first volume of the Resistance Welding Manual, are available at nominal charge at the office of the secretary, RWMA, 1900 Arch St., Philadelphia 3, Pa.

### CATALOG ON AUTOMATIC TIMER

This new 4-color illustrated catalog 17-AA provides complete information on a new automatic range timer. This timer has three instruments in one; electric clock, interval timer and separate automatic oven timer for fully or semi-automatic cooking. Models available for gas and electric ranges, with or without interval timer, and furnished in any color combination. Dept. MPM, International Register Co., 2614 W. Washington Blvd., Chicago 12, Illinois.

more Industrial Literature Page 65 →

## Automatic spraying expedites finishing of automobile components

in one setup, priming and finishing coats are applied within seconds — some masks are employed—electric eyes, relays, and solenoid valves control spraying of bumper parts as they pass through channels on belt conveyors

by Herbert Chase, M. E.

**A**PPPLICATION of spray coats to such automobile parts as hub caps and bumper components is among many finishing operations performed in General Motors' new Brown-Lipe-Chapin Division plant at Syracuse, N. Y. Especially noteworthy is the use of automatic spraying of some portions of hub caps and bumper guard stampings.

Such spraying follows electroplating of the components and is done to add touches of color or to increase corrosion resistance or both. As the volume of parts handled is large and economy in labor is important, setups that are semi-automatic and economize on time spent per part have proved well worth while.

In an accompanying photograph is shown a setup for automatic spray coating the inner faces of hub caps that constitute a very large production item. These caps are placed, by hand, one at a time, back face up in a spider that is arranged to rotate in a horizontal plane inside a spray booth but is fixed when loaded. After loading, the operator presses a pedal and rotation starts.

### Primed, finished at same station

Then, a fixed spray gun supplied with primer (1) is turned on automatically for a precisely timed interval just long enough to apply a suitable coating. At the end of this time, the primer spray is shut off and an oscillating finish coat spray gun is turned on immediately to apply the finish coating (2). As this spray is shut off, rotation stops and the spider is unloaded and reloaded by hand, starting the next cycle. Each hub cap

removed is hung on a passing conveyor that carries the caps through a dryer.

Similar spraying is done on portions of the face of some hub caps that are set in a spider against a mask on which they make a close fit. After rotation starts, a spray, directed upward from below the mask, feeds through the mask openings and onto the areas to be

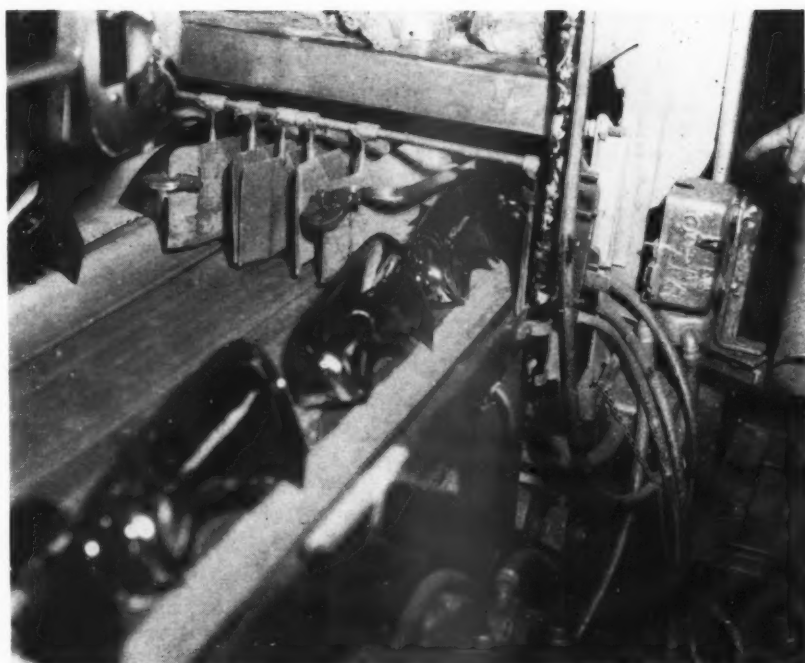
coated. As soon as the coat is applied, the spray is shut off, the part unloaded and another is put in place.

### Masks cleaned by degreasing

Masks have to be cleaned at intervals and are put through a degreaser (3) that strips the paint deposited on the mask, making it ready for reuse. Usually,



*Automatic spray coating the inner face of hub caps that are placed on a spider, which then starts to rotate as automatic spray guns apply, first, a primer, and then a finishing coat.*



tors. Such spraying is done between the point where plated parts come from racks and that at which final inspection is made, the belts delivering the sprayed parts to the inspection belt conveyor. Labor requirements are small as the spray setup itself involves only original setup and occasional inspection to see that it functions as specified.

NOTES: (1) Zinc Oxide Primer — (2) Alkyd Resin Enamel — (3) Tri-Chlorethylene Degreaser — (4) Nitrocellulose Lacquer

*Left: Chevrolet bumper guards are shown being advanced through a spray area. An electric eye shuts spray guns off and on as the stampings pass into, and leave, the spray area.*

*Below: An electric eye, to which a finger points, is used to coat the under side of plated stampings as they advance on belt conveyors. Spray is upward through space between belts.*

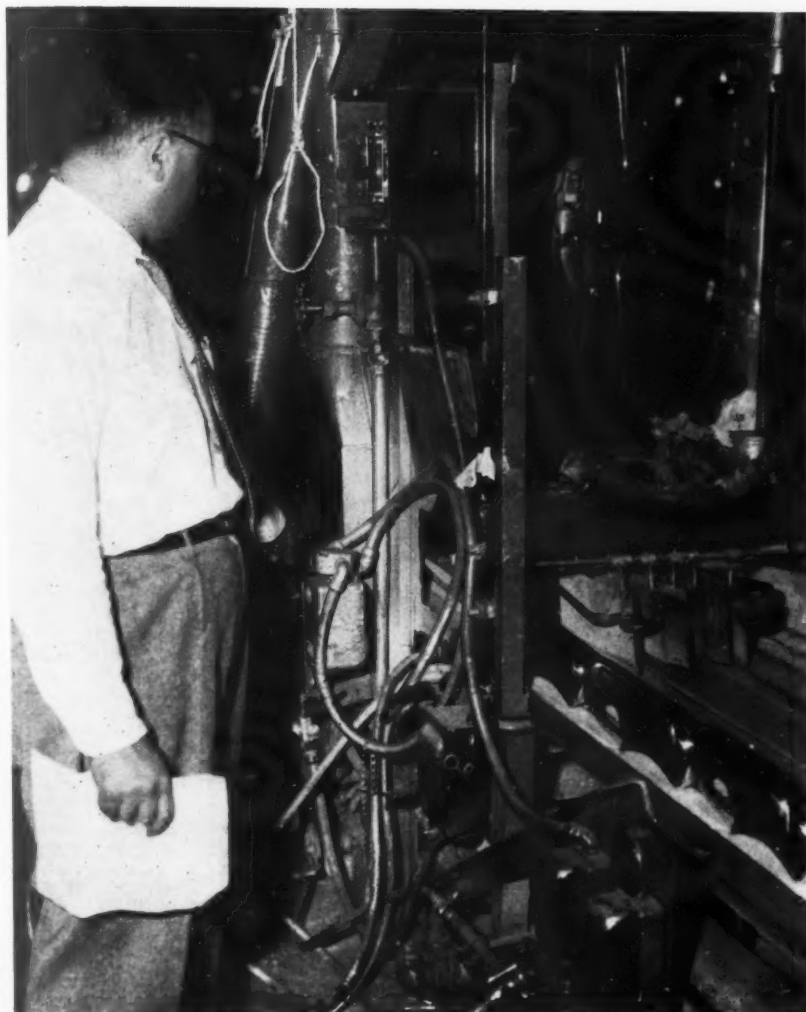
several identical masks are available so that those cleaned and dried are at hand for use without stopping the spraying cycles. If required, two or more colors can be applied using different masks but with time for drying each color before the next one is sprayed on. Such setups are very rapid and total time per piece is minimized.

Among other steel parts that require finishing of rear faces, normally not seen in service, after the parts are plated, are bumper guards such as those shown in Figs. 2 and 3. These parts are laid on belts that run horizontally at the same speed but with spaces between. In each instance, the parts are so set that they straddle the space which is left to facilitate exposure to spraying with an aluminum paint (4) that is directed upward through the space and inside the part to be coated.

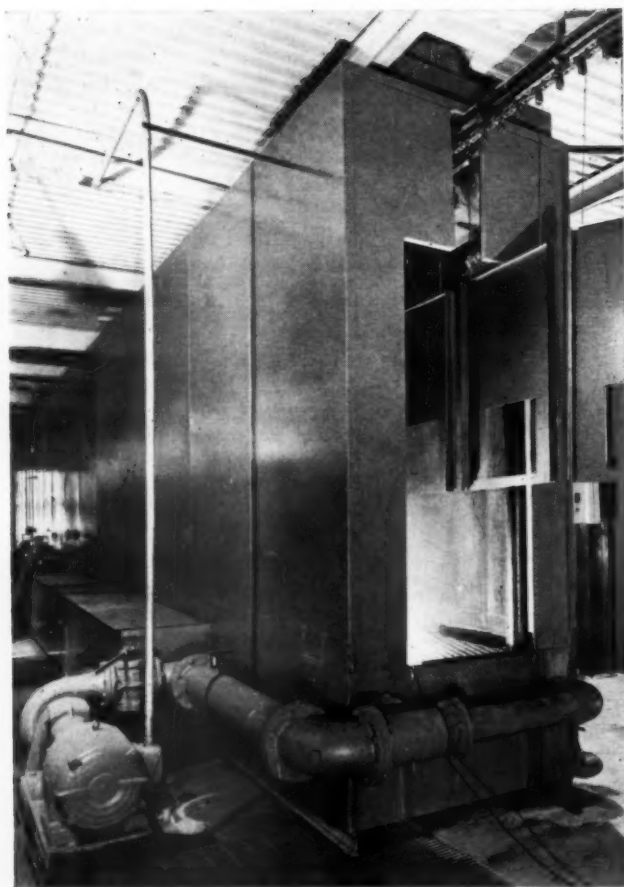
#### Electric eyes control spray

To control the spray gun or guns, electric eyes are arranged so that interruption of transverse light beams occur as the bumper guards are advanced by the belts. Relays are arranged to operate solenoid valves that turn the spray on when wanted and off when the parts are not in spraying position. This avoids waste of paint and also keeps the spray shut off when, at intervals, there is space between parts.

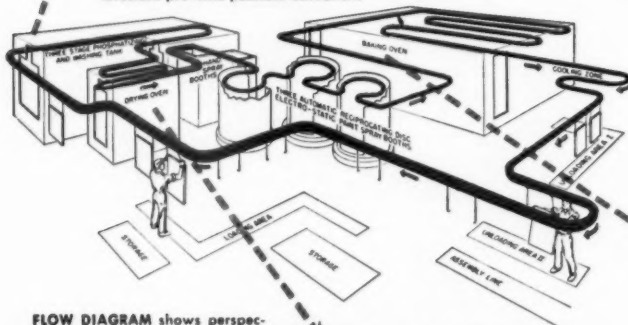
It is possible to use the same setup for different parts each of which is set to pass a given channel between separa-







**THREE STAGE** cleaning and phosphatizing unit is 88 ft. long. Here, metal parts are detergent-washed, chemically treated to convert the surface of the metal to an iron-phosphate coating, rinsed and sprayed with a dilute chromic, phosphoric acid solution. The phosphate coating prevents rust and corrosion from creeping under paint at points of future wear or damage. The chromic film over the phosphate structure prevents possible oxidation.



**FLOW DIAGRAM** shows perspective (not actual scale) of Mueller Climatrol's new metal processing and paint finishing conveyor system. Conveyor is 1300 ft. long; travels 15 ft. per minute. Parts are completely processed through entire system in one hour. Now, 10 men in 40 hours a week do what 24 men used to do in 50 hours.

**DRY-OFF OVEN** is gas fired. All moisture is baked out in three passes at 200° F., for three minutes. Parts move from here through hand spray operation (required on only 1% of the jobs) to automatic electrostatic spray booths where all colors of paint, including black and aluminum, are applied.



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finishing equipment  
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make a fast switch from  
**TWO SHIFTS  
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with no lost production!

Painting was a bottleneck at the Mueller Climatrol Division, Worthington Corporation, Milwaukee, Wis.

They had to run two shifts, each 50 hours a week, and had a hard time keeping up on furnace casings and an increasing amount of air conditioning components.

Now they're running one shift, 40 hours a week, thanks to a new system (see flow diagram) that was put into action smoothly and quickly with no lost time... no lost production.

Despatch helped by designing and fabricating the washing and phosphatizing machine... the gas-fired dry-off oven... the spray booth enclosures... and the giant baking oven.

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Bulletin 51**

16 colorful pages on modern ways to achieve better finishes, faster production and smoother handling of metal products... at lower cost.



## DESPATCH OVEN COMPANY

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Sales and Service in All 26 Principal Cities

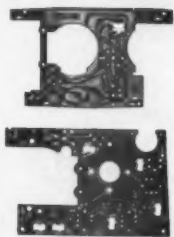
**BAKING OVEN** is located outdoors adjacent. There wasn't enough floor space or ceiling height in the finishing department. 300 ft. of conveyor in the gas-fired oven gives a 20 minute bake in five passes. Temperature is automatically controlled, recorded and maintained at 310° F.



**DESPATCH... PIONEERS IN ENGINEERING FINISHING SYSTEMS FOR INDUSTRY**

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- PARTS WASHERS



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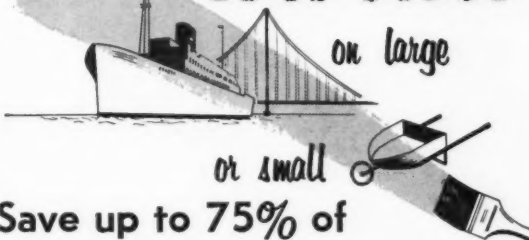
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Galvanizing cost with Z. R. C.®

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Z.R.C. dries in 30 minutes to a gray matte finish—the coating is tough, flexible and firmly adherent—may be built up to any thickness.

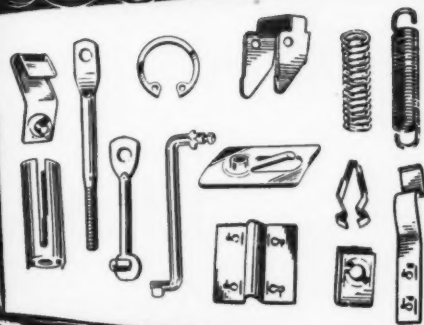
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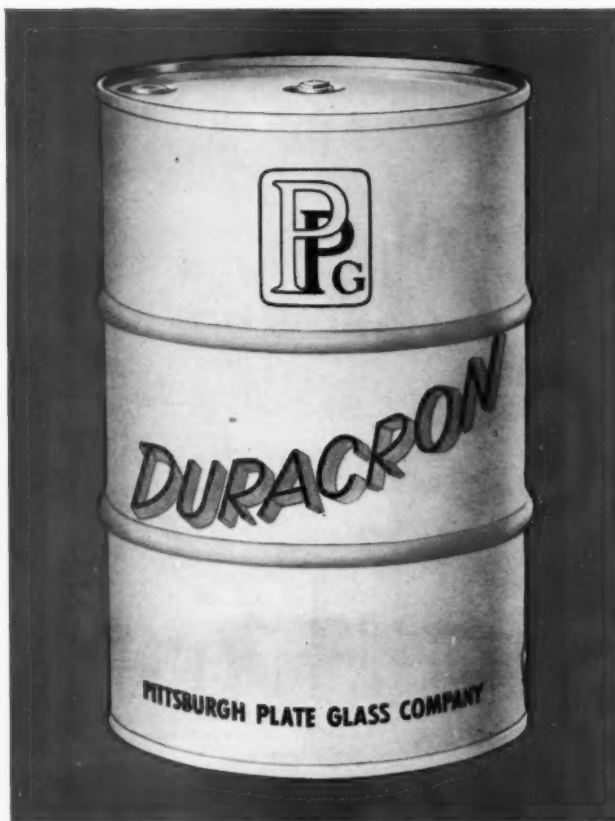
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in toughness, durability  
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- **New DURACRON** can also be used advantageously on many other products to improve performance of enamels now used. We'll gladly provide you with additional information. Mail coupon below to Pittsburgh Plate Glass Company, Industrial Finishes Division, 1 Gateway Center, Pittsburgh, Pa.

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### ADMIRAL TO HAVE HUGE TELEVISION PLANT

A 150,000 sq. ft. addition to Admiral Corp.'s electronics plant at Harvard, Ill., will make it one of the largest single facilities devoted entirely to television, radio, and phonograph production, it was announced by Ross D. Siragusa, president. The completed plant will have a production capacity of 6,000 TV receivers and 1,000 high fidelity phonographs daily.

"In this highly competitive television-appliance industry, it is vitally necessary to control production and distribution costs," Siragusa pointed out. "Television and appliance dealers, faced with substantial freight rate increases in recent years, have been hard-pressed to remain competitive with the giant stores capable of purchasing carloads of any one type of TV receiver or appliance. By building and warehousing all our electronic products under one roof, all Admiral dealers will be able to enjoy the advantage of quantity and shipping savings on a mixed freight car, or a mixed truckload of black and white TV receivers, color TV, portable TV, radios, radio-phonographs, and high fidelity phonographs."

### TRANE COMPANY IN STRONG COMPETITIVE POSITION, REPORT

Pointing to The Trane Company's expanded product lines, D. C. Minard, president, told a gathering of over 100 company regional managers and La Crosse, Wis., personnel recently that "Trane is in better competitive position than ever before."

Speaking at the opening session of a

two-day sales conference at La Crosse, the firm's president noted, "Trane is better manned, and in more depth, than at any time in its 44-year history. And, to the best of our knowledge, we have given young men more responsibility than any other company of our size in the country. We think our alert organization in La Crosse, and in the field, is one of the most important reasons for the success of our company."

### WESTINGHOUSE TO LAUNCH \$2,000,000 SALES PROGRAM

The Westinghouse major appliance division is going to spend \$2,000,000 to help today's "forgotten man, the retail salesman." The company will do it through a nation-wide promotion called "Bing-Bong," backed up with heavy national advertising.

John J. Anderson, division manager, announced the five-month sales training program which he said will produce cash and merchandise awards for more than 7,000 retail salesmen. Westinghouse is unveiling details of the program to retailers and their salesmen at the first of a series of regional meetings.

### ASTE CELEBRATES SILVER ANNIVERSARY

The American Society of Tool Engineers celebrates its silver anniversary in 1957. Big plans are being made for the annual meeting, which is to be held in Houston, Texas, March 23-28.

Included on the meeting program is a closed circuit broadcast to ASTE chapters on March 25 (evening of the anni-



versary banquet). One feature of this broadcast will be the simultaneous installation of all national and chapter officers and directors—over 1100 of them in 143 chapters all over the U.S. and Canada. Other portions of the broadcast will include live comments and salutes from chief industrial executives, statesmen, educators, foreign dignitaries, and entertainers.

Another feature of the program will be a long-distance telephone chartering of an Australian chapter.

### 1956 HOME LAUNDRY APPLIANCE SALES ESTABLISHED NEW RECORD

Total factory sales of home laundry appliances during 1956 amounted to 6,107,457 units, a new sales record for the industry, Guenther Baumgart, executive director of the American Home Laundry Manufacturers' Assn., announced. Sales were seven per cent above 1955, the previous peak year in the industry's history.

Baumgart further reported that industry market research experts have estimated that 1957 sales will exceed the 1956 record by more than 300,000 units.

### GAMA ADDS MEMBERS IN FOUR DIFFERENT DIVISIONS

Addition of one member to each of four divisions of the Gas Appliance Manufacturers' Association has been announced by Harold Massey, managing director.

New association members are the Boston Stove Foundry Co., Reading, Mass., a range manufacturer; Altorfer Bros. Co., East Peoria, Ill., manufacturer of gas clothes dryers; and North Coast Manufacturing Corp., Portland, Ore., producer of gas-fired furnaces.

Also, the industrial division of the Minneapolis-Honeywell Regulator Co., headquartered at Philadelphia, has joined GAMA's industrial division. GAMA states that this is in addition to the company's participation in the trade association through its controls division.

### AIR CONDITIONING APPLICATION SYMPOSIUM SET FOR APRIL

A Government-Industry symposium on general air conditioning applications will be held in Washington, D. C., early in April, it has been announced, following a meeting of a Government-Industry committee named in December to make arrangements for such a session.

Objective of the discussions, in which air conditioning industry spokesmen and Government officials from both civilian and defense agencies will participate, is to recognize the modern necessity of air conditioning and, through the pooling of knowledge of Government and industry, to develop a better understanding of what air conditioning can accomplish for Government and industry, and domestic users, and to obtain the maximum benefit from manpower and money spent on air conditioning.



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**QUALITY CONTROL CHECKS**  
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Frits from Hommel must pass the most exacting tests in the industry . . . assurance that you are receiving the highest quality frits that can be produced. From raw materials to the finished product, check upon check is made to maintain top quality production. Run comparative tests and

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**1** Production lots limited to 10 bags each for really close control.

**2** A dozen or more individual checks of raw materials and frit in process to assure highest quality in manufacture.

**3** Each bag "registered" — two-part lot tag attached at start of manufacture for positive identification throughout.

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**6** Lot tag remaining on bag assures you of positive identification of frit produced under exacting quality controls.

## **MILLION INCREASE RECORDED ON DEALER RADIO SHIPMENTS**

The Radio-Electronics-Television Manufacturers' Association recently reported an increase of more than one million radio receivers shipped to dealers from manufacturing plants during the 11 months ending November, 1956, compared with the same period a year earlier. In addition to the cumulative increase, radio set shipments in November were recorded above the number sent in October.

In November, RETMA reported 797,011 radios shipped to dealers, including 2,278 units sent to the Territories. This compares with 751,795 receivers shipped in October, and 849,264 radios sent to dealers in November, 1955.

Cumulative radio shipments during the 11-month period, 1956, totaled 6,877,836 units compared with 5,803,541 radios shipped to dealers during the same period in 1955.

## **NASHVILLE ENAMELING PLANT LONG ON PORCELAIN KNOW-HOW**

Porcelain Industries, Inc., Nashville, Tenn., a jobbing shop equipped for porcelain processing on cast iron and steel stove parts, porcelain enamel signs, and architectural porcelain, have complete enameling facilities, and the firm has been actively engaged in this field for the past thirty years. Growth of the company has been rapid, it is stated, and in the future, the firm's attention will be concentrated on architectural and sign porcelain enameling.

Principals of the company are: John H. Leinart, president; John M. Walsh, vice president and sales manager; N. K. Hayes, treasurer; G. B. Dickey, chairman of the board; E. B. Cothron, secretary; Bates Parman, executive vice president; and R. E. Bates, plant superintendent. Leinart, Walsh, and Hayes have been affiliated with the manufacture of appliances, and Bates has been actively engaged in the porcelain enamel field for approximately 30 years. Dickey, Cothron, and Parman are engaged with the financial transactions of the company through their investment firm, Trans American Oil Co.

## **DUSHANE NAMED CHAIRMAN OF GAS CONSUMER AD UNIT**

The Gas Equipment Manufacturers' Committee recently announced the election of C. Benson Dushane, American Meter Co., as its chairman. The committee, made up of manufacturers whose

products ordinarily are not sold directly to consumers, conducts the GEM program to advertise the advantages of gas appliances and household gas service.

Other officers of the committee have been named as follows: vice chairman, K. R. D. Wolfe, Fisher Governor Co.; operating committee members, G. T. Bowman, Rockwell Manufacturing Co.; C. H. Abbott, Sprague Meter Co.; and Carl N. Brown, U. S. Pipe & Foundry Co.

## **BATTELLE INSTITUTE EXPANDS**

Dr. Zay Jeffries, metals scientist and retired vice president of the General Electric Co., has been reelected chairman of the board of trustees of Battelle Institute, Columbus, Ohio, it was announced. Along with Jeffries, seven other officials were elected at the board's annual meeting which closed out one of the most expansive 12-month periods in the Institute's 27-year history.

In addition to election of officers, the board reviewed plans for two previously approved buildings to be constructed at its Columbus site, authorized purchase of additional land near the Battelle nuclear research center, planned extension of an educational program set up for Battelle staff members, and acted to broaden the management responsibilities of Battelle officers.

## **TEMCO ANNOUNCES PRODUCT CHANGES FOR 1957 LINE**

A number of product changes has been made by Temco, Inc., Nashville, Tenn., in its nationally promoted line of gas heating equipment. Among the major changes is the development of a built-in draft relief on the wall heaters, which substantially lowers stack temperatures. The blower attachment on the wall heater, which provides more rapid circulation of heated air, is now available for the single wall model as well as the dual wall model.

A change in the space heater line is the use of a diffusion type blower assembly which provides a more even flow of warm air at floor level. Included in the controls offered with both space heaters and wall heaters are the new Minneapolis-Honeywell Pilotstat and Adatrol.

The Temco air conditioning equipment now includes two horsepower and four horsepower self contained multi-zone units with pre-charged components. A suspended air-cooled air handling unit for commercial application has been added to the line.

## **GAS RANGE SHIPMENTS BELOW 1955 LEVEL**

Shipments of domestic gas ranges in 1956, excluding built-ins, totaled 2,008,400 units, down 11.4 per cent from the previous year, the Gas Appliance Manufacturers' Assn. announced recently. The 1955 total was 2,266,600. Edward R. Martin, GAMA director of marketing and statistics, reported December shipments were 118,700, down 22.7 per cent from the 153,600 in the same month a year earlier.

Martin pointed out that part of the dip in free-standing ranges was offset by continued gains in built-in models. Gas built-in ranges shipped in 1956 are estimated at 160,000 units, as against 100,000 in 1955. The GAMA statistics are based on a telegraphic survey among manufacturers accounting for most of the country's gas range production. Totals thus obtained are expanded to yield national shipment figures.

## **AIEE EIGHTH ANNUAL APPLIANCE TECHNICAL CONFERENCE SET**

The Eighth Annual Appliance Technical Conference, sponsored by the Subcommittee on Domestic Appliances of the American Institute of Electrical Engineers, is scheduled to be held May 20-21 in the Engineering Societies building, Detroit, Mich. Major theme of the conference will be Appliance Controls and Development. Papers will cover subjects on top unit thermostats for ranges, microwave ovens, timers, thermostats, washer-dryer controls, safety, appliance load studies, and solenoid standards.

## **BETTINGER CORP. DEVELOPS 22 CARAT CERAMIC GOLD FINISH**

Nathaniel Cannistraro, assistant sales manager of the Bettinger Corp., Waltham, Mass., has announced what is reported to be the first ceramic gold 22 carat finish for architectural use that has been developed. The gold, fused into the surface of the ceramic, is permanent, Cannistraro said. Bettinger feels that this opens the way for the widespread use of gold finishes in curtain wall construction, now popular for larger buildings. In the past, the report states, it was felt that genuine gold finishes were far too expensive, but now, by the very thin application fusing method, 22 carat gold finishes can be produced that are competitive in price with other finishes.



## 1956 VACUUM CLEANER FACTORY SALES TOP THOSE OF '55

Factory sales of standard-size household vacuum cleaners in 1956 topped 1955 by 13.8 per cent, totalling 3,721,870 units, compared to 3,270,441 in the earlier year, according to figures for the industry announced by the Vacuum Cleaner Manufacturers' Association.

Sales in December were down 6.4 per cent from the total for the preceding month, aggregating 281,025 cleaners, compared to 300,381, and topped sales of 243,457 units in December, 1955 by 15.4 per cent.

## AIR CONDITIONERS TO APPROACH BILLION IN 1957, FRIGIDAIRE

Industry retail sales for room units, central residential, and all other packaged commercial air conditioning equipment will approach the billion-dollar mark for the first time in 1957, C. H. Menge, Frigidaire general sales manager has predicted.

In what he described as a "realistic appraisal," Menge estimated this important segment of the industry will show an 11 per cent increase over 1956.

Menge made his forecast in connection with the introduction of Frigidaire's new 1957 room air conditioner line at the opening of the Chicago furniture market. Seven window-type room air conditioners with cooling capacities from one-half to one and one-half horsepower are included in the new line. The new models feature the same uncluttered "sheer look" styling of Frigidaire's 1957 home appliances.

In achieving a record year, room air conditioners will again lead the way with estimated unit sales of 1,750,000, Menge predicted. Sales of these units totalled 1,600,000. Annual room unit sales will pass the 2,000,000 mark in 1960, Menge said, with the volume at approximately 2,500,000 units in 1965. Sales of residential and other packaged air conditioners will aggregate 300,000 units in 1957, as compared with 241,000 in 1956, he reported.

The Frigidaire executive said this equipment will enter a "take-off phase" beginning in 1960 with sales almost double the 1957 total, and predicted that nearly a million such units will be sold in 1965.

Industry sales of air-cooled condensing units and coils for remote systems will also show a sharp rise during 1957, with a projected 44.5 per cent boost over 1956 figures, Menge stated.

## WESTINGHOUSE APPLIANCES SHOW GAIN DESPITE STRIKE

The Westinghouse Electric Appliance Divisions in 1956 achieved their goal of doing 12 months business in the nine remaining when the company-wide strike ended. John W. Craig, Westinghouse vice president and general manager of the divisions, said the firm's appliance sales surpassed company 1955 totals in 28 out of 32 product categories. In all but four of the 32, the firm's performance was better than the industry average for the year 1956.

## AMERICAN MOTORS AWARDED NAVY CONTRACT

American Motors Corp. has been awarded a contract to build a major component for the Navy's powerful new Martin Jet seaplane, the P6M Sea-Master, George Romney, American Motors president, announced recently.

The contract, with the Martin Co., involves design engineering, tooling, and manufacturing of rotary mine bay doors for the 600 mile-an-hour plane. It was awarded to American Motors' Special Products division in Detroit.

### What's New

**Removable manifold**  
Entire manifold removes in seconds—without tools

**Winged water curtain**  
Swings up for easy skimming of entire collecting pan.

**Complete water circulation**  
No dead ends to accumulate sediment.

## DITTO COMPLETES FACTORY THAT GROWS THREE WAYS

Completion of a unique manufacturing plant that grows three ways was announced recently by Ditto, Inc., Chicago. Located on a 27-acre site in Lincolnwood, a suburb, the building can grow upward, outward, and within. It is expected to answer the growing pains of a duplicating equipment manufacturer that has expanded 11 times in the past 48 years.

This large manufacturer of direct process duplicating machines recently ex-

panded operations by introducing the first offset duplicator designed especially for office use.

"We expect this new building will take care of us for at least the next five years," Kenneth M. Anderson, president, said. "After that, we'll utilize the built-in features of the plant that make it possible to expand quickly at a minimum of cost."

The building contains an 800-ton air conditioning unit, powered by a 700 hp compressor, which cools all of the office area and 20 per cent of the manufacturing area.

## AMERICAN WELDING SOCIETY SCHEDULES SPRING MEETING

Where and how welding is being used in the fabrication of nuclear power plants will be the subject of two technical sessions at the forthcoming National Spring Meeting of the American Welding Society. The meeting will be held in conjunction with the Fifth Welding and Allied Industry Exposition in Philadelphia, April 8-12.

Several papers will discuss welding problems involved in designing and fabricating nuclear reactors. Recently developed procedures and techniques for welding reactor components will also be described. Other papers will cover the effect of neutron radiation on weldability and mechanical properties of structural metals.

A special feature of this meeting will be the sponsoring of three sessions by the committee of Electric Welding of the American Institute of Electrical Engineers. Paralleling the arrangements made with the ASME for the 1956 Spring meeting, the AIEE will meet with AWS in Philadelphia and sponsor papers that are of similar technical interest to both groups. Two of the sessions will deal with resistance welding; the third will cover arc welding.

A total of eighteen sessions are planned for the five-day meeting. In addition to the above mentioned papers, latest developments in other fields of welding activity will be reported. These include welding of titanium and zirconium; brazing stainless steels and high temperature alloys; new techniques in precision welding control; filler metals for welding high-strength steels; zinc soldering of aluminum; welding of missile airframes; and the use of welding in foundries.

Technical sessions will be held at the Hotel Sheraton, AWS headquarters for this meeting. The Welding Show will be located at Convention Hall.

## Binks Style "E" Dynaprecipitor Water Wash Spray Booth

...easy to maintain...needs minimum space

### Built for easy maintenance

Entire manifold and front water curtain come out in seconds—without tools! Really simplifies occasional clean-up of manifold, upper wash chamber, rear water curtain and rear exhaust chamber. Hinged water curtain permits skimming of entire collecting pan without dismantling booth!

### Built for low maintenance

All paint collecting surfaces continuously water scrubbed. Curved wash chamber surfaces prevent

paint build-up. Complete water circulation system has no dead ends to accumulate sediment.

### Needs less floor space

New design shortens depth of wash unit. Never before a booth with such maintenance ease.

### Free descriptive bulletin

Ask your Binks jobber or industrial distributor for a copy of Bulletin DUE, or write direct to the address below.



Ask about our spray painting school

Open to all...NO TUITION...covers all phases

**Binks**  
EVERYTHING FOR

SPRAY PAINTING



SPRAY GUNS



AIR COMPRESSORS



ACCESSORIES

**Binks Manufacturing Company**

3122-40 Carroll Ave., Chicago 12, Illinois

REPRESENTATIVES IN PRINCIPAL U.S. & CANADIAN CITIES • SEE YOUR CLASSIFIED DIRECTORY

## NATIONAL ASSOCIATION OF STORE FIXTURE MANUFACTURERS MEET

A program of round-table discussions, forum meetings, inspirational talks, and social events is being organized by the National Association of Store Fixture Manufacturers for the visitors expected at the two-day First Annual National Trade Exposition of Suppliers to the Bank, Office, and Store Fixture Industry, scheduled to be held March 21-22 at the Conrad Hilton hotel, Chicago.

## PMI ANNUAL SPRING TECHNICAL MEETING SET

The Pressed Metal Institute, national association of the metal stamping industry, has released the advance program for its 1957 Spring Technical Meeting, to be held at the Hotel Carter, Cleveland, Ohio, Wednesday through Friday, March 6-8.

This meeting has gained in national stature since its inception in 1950, for men primarily interested in the technical advancement of the punch press industry.

According to PMI, delegates from all sections of the United States and Canada will be in attendance to listen to authorities discuss the current safety and technical trends of the second largest metal consuming industry in the world.

## HOST COMMITTEE ANNOUNCED FOR PHILADELPHIA PAINT MEET

P. J. "Jack" Whiteway, Jr., G. D. Wetherill Varnish Co., Camden, N. J., has been named chairman of the Host Committee for the 35th Annual Meeting of the Federation of Paint and Varnish Production Clubs at the Bellevue-Stratford hotel, Philadelphia, Pa., Oct. 30 through Nov. 2, 1957.



WHITEWAY



OTT

Assisting Whiteway will be the following Host Committee chairmen; 1) *Registration*—co-chairman Robert Toot-hill, G. D. Wetherill & Co., and Walter Bayer, Sinclair Refining Co.; 2) *Operations*—Bob Cox, Gilbert Spruance Co.; 3) *Banquet*—John Williams, Calbar Paint & Varnish Co.; and 4) *Entertainment and Dance*—Harold Gough, Finnaren & Haley, Inc.

The Host Committee, all members of the Philadelphia Paint and Varnish Production Club, will be in charge of the convention arrangements for the Federation Meetings Committee, of which Eugene H. Ott, Ferbert-Schorn-dorfer Co., Cleveland, Ohio, is chairman. Ott stated that the official announcement of the Annual Meeting, with enclosed hotel reservation forms, will be distributed soon.

to Page 77 →

## PRESSED METAL INSTITUTE PROGRAM

Chairman:

H. A. Daschner, Managing Director  
Pressed Metal Institute

WEDNESDAY — MARCH 6

8:00 A.M. — 9:30 A.M.

REGISTRATION FOR ALL  
SESSIONS

9:30 A.M. — 12:15 P.M.

PRESIDENT'S WELCOME

Mr. Bruce Krasberg, President  
Pressed Metal Institute, and  
R. Krasberg & Sons Mfg. Co.,  
Chicago, Illinois

SAFETY & PRODUCTIVITY

*From Management's Side*

Mr. Charles Cavano, Partner  
Employers Service Foundation  
Cleveland, Ohio

*From the Designer's Side*

Mr. L. A. Faulkner, Supervisor  
Industrial Plant Service  
Liberty Mutual Insurance Co.,  
Boston, Massachusetts

*From the Worker's Side — or — What is  
YOUR Washroom Rating on Safety*

*Moderator:*

Mr. Ben Small, Personnel Director  
Morrison Steel Products, Inc.,  
Buffalo, New York

*Mr. Punch Press Operator*

Mr. Michael Fredrix  
Variety Stamping Corporation  
Cleveland, Ohio

*Mr. Die Setter*

Mr. Cass DiRoberto  
Worcester Pressed Steel Co.  
Worcester, Massachusetts

*Mr. Material Handler*

(To be announced)  
*Mr. Maintenance Man*  
(To be announced)

12:30 P.M. — 2:00 P.M.

LUNCHEON

*Toastmaster:*

Mr. James R. Oviatt, President  
The D. C. Oviatt Company  
Cleveland, Ohio

Chairman, PMI's Safety Committee

*Featuring:*

Presentation of PMI's 1956 Safety  
Awards, and  
PMI's Safety Quiz

2:15 P.M. — 4:30 P.M.

AIR AS A PRODUCTION AND  
SAFETY FACTOR

Mr. Frank Engstrom, Manager,  
Industrial Products Sales Dept.  
A. Schrader's Son  
Brooklyn, New York

FLEXIBILITY OF MATERIAL  
HANDLING

Mr. Robert C. Brady, Sales Engineer  
W. B. McClelland Company  
Cleveland, Ohio

5:00 P.M.

OPEN HOUSE, Hosts,  
PMI's Cleveland District

THURSDAY — MARCH 7th  
MODERNIZING EXISTING  
EQUIPMENT

9:30 A.M. — Noon

*Chairman:*

Mr. Carl Johnson, Chief Engineer  
Larson Tool & Stamping Company

Attleboro, Massachusetts

Mr. J. Walter Gulliksen

Vice President & General Manager

Waterbury Manufacturing Company, Div.

Chase Brass and Copper Company

Waterbury, Connecticut

Mr. Floyd B. Keser, Jr., President

The Pneumatic Applications Company

Simsbury, Connecticut

Mr. Neil Van Deusen, General Sales Mgr.

V & O Press Company, Div. Emhart Mfg.

Hudson, New York

CHECKING FIXTURES & HOW TO  
MAKE THEM INEXPENSIVELY  
Mr. William E. Hoffman, Associate Editor  
Tooling and Production Magazine  
Cleveland, Ohio

12:15 P.M. — 1:45 P.M.

LUNCHEON

*Toastmaster:*

Mr. Bruce Krasberg, President of  
PMI and R. Krasberg & Sons Mfg. Co.  
Chicago, Illinois

*Speaker:*

Dr. Laurence Hall, East Cleveland, Ohio

"As Others See You"

2:00 P.M. — 4:30 P.M.

DIE MAINTENANCE & RELATED  
PROBLEMS

Round table discussion — broken down ac-  
cording to size of company and stamping  
produced.

4:30 P.M. — 5:30 P.M.

BERMUDA BOUND PARTY

6:15 P.M.

PAY AS YOU GO  
ENTERTAINMENT

Penthouse  
Theatrical Grill  
715 Vincent Ave.

FRIDAY — MARCH 8

8:00 A.M. — 8:15 A.M.

REGISTRATION

8:15 A.M. — 12:15 P.M.

PLANT VISITATIONS

Transportation by chartered  
buses leaving front door of  
Hotel Carter and returning.  
Plants to be visited:  
Chevrolet-Cleveland Div. of GMC &  
The Barth Corporation

12:30 P.M. — 2:00 P.M.

LUNCHEON

*Toastmaster:*

Mr. J. W. Kootz, Sales Eng.  
S. W. Evans & Son, Philadelphia  
Chairman PMI's Technical Re-  
search & Standards Committee

*Featuring:*

Presentation of John Woodman  
Higgins Award

2:15 P.M. — 4:30 P.M.

FINDING AND SOLVING THE  
CAUSES OF TROUBLE IN DEEP  
DRAWN PARTS

Mr. Stanley R. Cope, President  
Acme School of Die Design Engineering  
South Bend, Indiana

4:30 P.M. — 8:00 P.M.

ADJOURNMENT COCKTAIL  
PARTY



## New Industrial Literature

(continued from Page 53)

### BASE FOR DURABLE PAINT FINISHES AVAILABLE

ACP Granodine is designed to provide an excellent base for durable paint finishes on automotive equipment, home appliances, and industrial products by chemically converting steel surfaces to a nonmetallic phosphate coating. It increases the adhesion of the finish and provides a good corrosion resistance. Bulletin 1380 describes the various types of ACP Granodine, and gives information which will help you select the proper type for your particular application. Dept. MPM, American Chemical Paint Co., Ambler 33, Pa.

### FUNCTIONAL LOCKS

A new catalog describes a line of locks (plate, lever, and pin tumbler types) for cabinets, office equipment, a wide variety of appliances, and metal products. All sizes, shapes, and specs are offered. Write for catalog 156. Dept. MPM, National Lock Co., Rockford, Illinois.

### SPECIAL CORRUGATED CONTAINERS FOR APPLIANCES

This company has developed a specially coated board for use as interior packing in shipping containers for appliances and paint or enamel finished metal products. It protects against rubs and blemishes without leaving any residue on the merchandise, and prevents abrasions to delicate, highly polished finishes caused by vibrations during shipment. Send for your copy of the special data sheet on Stone-ize corrugated. Dept. MPM, Stone Container Corp., 4218 W. 42nd Place., Chicago 32, Illinois.

### PORCELAIN ENAMEL FOR ALUMINUM

A technical bulletin provides useful information on how you can expand your enameling volume by adding aluminum enamels to your line of finishing services. Write for technical bulletin CP 4-454, Dept. MPM, E. I. du Pont de Nemours & Co., Electrochemicals Dept., Wilmington 98, Delaware.

### LONG WEARING PRODUCT LABEL

It is claimed that this label will withstand extreme conditions of temperature and abrasion, and remain bright

and easy to read for years. The label is aluminum foil backed with adhesive — requiring no screws, pins, or heat for normal application. Write for the brochure on this label. Dept. MPM, C & H Supply Co., 415 E. Beach Ave., Inglewood 3, Calif.

### HIGH SPEED PRESS

A new brochure provides complete information on the "flying press." This press processes as much as 300 feet of metal per minute, and will make as many as 600 strokes per minute. Write for your copy of the Wean "Flying Press" brochure. Dept. MPM, Wean Equipment Corp., Cleveland 17, Ohio.

### WHY HOT SPRAY?

This booklet, entitled "Why Hot Spray?," contains case histories, questions, and answers about this method of spray application. If you are interested in additional information on this subject, write Dept. MPM, Spee-Flo Corp., 720 Polk Ave., Houston, Texas.

### ELECTROSTATIC SPRAY PAINTING

If you are interested in additional information on electrostatic spray painting, write for the No. 2 Process brochure. The brochure contains production-line examples of how other manufacturers are using this equipment. Dept. MPM, Ransburg Electro-Coating Corp., Indianapolis 7, Indiana.

### BULLETIN ON FINISHING SYSTEMS

This bulletin contains 16 pages of suggestions, tips, and ideas on modern ways to achieve better finishes, faster production, and smoother handling of metal products. Write for bulletin 51. Dept. MPM, Despatch Oven Co., 619 S.E. 8th St., Minneapolis, Minnesota.

### SOUND FILM TELLS ENGINEER'S ROLE IN WORLD OF TOMORROW

The type of training necessary for the engineering profession, and the engineer's role in planning the world of tomorrow, are the subjects of a new non-technical color movie just released by the College of Engineering, Ohio State university. The 20-minute sound film, "Engineering for Eddie," centers on the "fairy-tale world" of little Eddie Smith. Designed to serve as a guide to today's youngsters and their parents, the film evaluates the educational re-

quirements and practical applications of engineering training, and outlines the contributions of the engineer to the state and the nation. The film is also useful in that it attempts to encourage qualified students to enter one of the many fields of engineering to help meet the critical need for more and better trained engineers. The film is available on a free-loan basis, or for purchase, from the Department of Photography, Motion Picture Division, Ohio State University, Columbus 10, Ohio.

### "PLAN IT FOR PLASTICS"

This attractive brochure outlines the facilities available at Molded Products Division of Admiral Corp. Covers design, engineering, research, development, mold-making, moldings, finishing, secondary machining, and assembly. Dept. MPM, Molded Products Div. of Admiral Corp., P.O. Box 338, West Chicago, Ill.

### PRIMITIVE ART TO IMPROVE TODAY'S PRODUCTS

This bulletin illustrates the application of decorative glass. It discusses the four major points designers should know when considering decorative glass for product restyling. Write to Croname Glass Studios, Dept. 20, 3701 N. Ravenswood Ave., Chicago 13, Illinois.

### HOW TO BUY A MOTOR

**New** An eleven-page bulletin gives buying information on a selected group of motors. Included are application data, ratings and prices for fractional horsepower motors, integral-horsepower polyphase and single phase induction motors, motors and control for part-winding starting, gear-motors and resilient-base integral-horsepower induction motors. General Electric Co., Schenectady 5, N. Y.

### SMALL MOTORS DETAILS

**New** More horsepower in a smaller unit is analysed in detail in a newly published 4-page brochure. Included in the brochure is a description of the features and applications of the new miniature motors, plus detailed cut-away photos. Standard ratings and a dimensions diagram are also included. Redmond Co., Inc., Owosso, Mich.

### STEEL SHOT CLEANING

**New** Literature about a new steel grit blast cleaning abrasive has been published. Details on various shot blasting processes are given. Wheelabrator Corp., Mishawaka, Ind.

## INDUSTRY PERSONALS

Dr. Clarence Zener has been appointed director of the Westinghouse Research Laboratories, it was announced by Dr. J. A. Hutcheson, vice president, engineering, for Westinghouse Electric Corp. Dr. Zener assumes his new post after five years as an associate director, and a year as acting director of the 800-member staff of the laboratories, which only recently occupied completely new research fa-

cilities in Churchill Borough, ten miles east of downtown Pittsburgh.

Appointment of Harry F. Appelstein as treasurer of the Lewyt Corp., makers of electronic equipment, vacuum cleaners, and air conditioners, was announced by Alex Lewyt, president. Appelstein was formerly vice president and treasurer of the Samuel M. Langston Co. and, prior to that, was a financial executive in Philadelphia.

The appointment of William M. Faber as half-time research assistant in Ceramic Engineering at the University of Illinois was recently announced. He will work on the Air Forces Research Project under Dr. A. L. Friedburg. The project is concerned with the application of enamel coating to wire.

Faber will graduate with a baccalaureate degree from Illinois in June, and will continue working toward a master's degree in Ceramic Engineering, the report states.

Wayne L. Gasper has been promoted to the newly-created position of assistant chief engineer of the laboratory and technical processes at the Maytag company's Plant in Newton, Iowa. Gasper, who formerly served as senior process engineer in the Maytag Plant 2 laboratory, has been employed by the appliance manufacturing firm since January 31, 1949.



GASPER



UPTON

Appointment of David F. Upton to the position of director of purchases for the St. Joseph Division of Whirlpool-Seeger Corp. was announced recently by Otto Krauss, general manager of the division. Upton succeeds M. R. Denison, who had been director of purchases for the division since April, 1954. Denison will retire this year.

Krauss also announced a realignment of duties for others in the purchasing department. Leonard J. Hardke, purchasing agent, will assume greater responsibilities in general administration of the department. C. R. Jones, formerly a steel buyer, has been appointed assistant purchasing agent in charge of raw materials and stampings procurement. Kenneth Burd has been named value analyst, and Jerome Warren supervisor of follow-up activities. All will report to Upton.

The Permglas Division of the A. O. Smith Corp. has appointed W. T. Halket and J. W. Burleson to general sales manager positions. Halket was formerly assistant general sales manager. Burleson, in charge of Permglas home heat-

Tuttle Band-Type Heating Elements...for Consumer and Industrial Applications

**LIVE BETTER ELECTRICALLY**

*NYKELKROM*

The versatility of NYKELKROM band-type heating elements make them adaptable to an almost endless variety of applications.

These flexible metal-clad units are shipped flat so the user can shape them to his own requirements and apply heat directly to all surfaces as needed.

Available in a complete range of wattages, voltages, lengths and widths.

**H. W. TUTTLE & CO.**  
**Adrian, Michigan**

Manufactured and distributed in Canada by  
CRONAME (Canada) Ltd., Waterloo, Quebec

*Tuttle  
of  
Adrian*

ing and air conditioning equipment sales, was also an assistant sales manager.

The American Gas Association has announced the appointment of *Ralbern H. Murray* as assistant secretary of its industrial and commercial gas section. Murray has been with the AGA utilization bureau since 1950. In his last position with AGA, he worked on utilization problems of gas utilities and manufacturers, and served as a local appliance inspector for AGA laboratories. He was also secretary of the American Society for Testing Materials Committee D-3 on Gaseous Fuels, and served on several other association committees.

*Claire U. Haverly, Jr.* has been named chief engineer, and *Rudolph Foss*, regional sales manager of the Haverly Equipment Division, John Wood Co., Syracuse, N. Y., it was announced by G. W. Schelling, vice-president and general manager of the Haverly Equipment Divisions, which produces bulk milk coolers.



HAVERLY



FOSS

In addition to farm refrigeration equipment, John Wood Co., manufactures a wide range of steel products including, milk cans, wire crates for milk bottle distribution, gasoline pumps, automatic tire inflation equipment, pneumatic and ASME code tanks, gas and electric water heaters, and heating equipment for home and industry.

*Paul I. Berno*, merchandising director of the Tappan Stove Co., Mansfield, Ohio, has been appointed treasurer of the company, it has been announced by Alan P. Tappan, president. He replaces A. C. "Dusty" Rhoads, vice president and treasurer, who has retired.

Berno has been sales correspondent, territory sales manager, assistant sales manager, and development manager since joining Tappan in 1946.

*Charles C. Wilson*, district sales manager, has been named to succeed Berno as merchandising director, and *Robert G. Appleby* will assume the duties of the newly-created position of assistant treasurer. Appleby will also continue as

## new glamour in the kitchen

### with NICKELOID METALS

*Pre-Plated Metals Offer Design Freedom, Production Savings!*



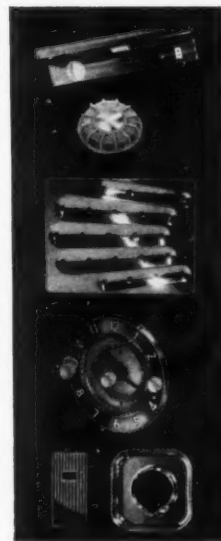
Beautiful, easy-to-clean built-in range by Oakland Foundry, Belleville, Ill., features Nickeloid pre-plated chrome steel, satin finish, for door panels, oven, burner inserts, control panel and hood.

### More Than A Metal—It's A Method

Oakland Foundry, Belleville, Ill., a leading manufacturer of electric ranges, puts it this way: "We were unable to fabricate the alternate material without new tooling. Nickeloid Metals have increased our production, reduced rejects and lowered the costs of our product".

If you are caught between increasing manufacturing costs and the constant consumer demands for new and improved products, consider Nickeloid *Pre-Finished* Metals. An extremely versatile design material, they fit right in with standard production techniques, without major retooling — lower manufacturing costs and equipment investment because they require no cleaning, post-plating, polishing. You just fabricate and assemble — and save!

Choose from beautiful, durable finishes of chrome, nickel, copper or brass on steel, zinc, copper, brass and aluminum. Sheets, strips, coils.



NICKELOID METALS

SINCE 1898



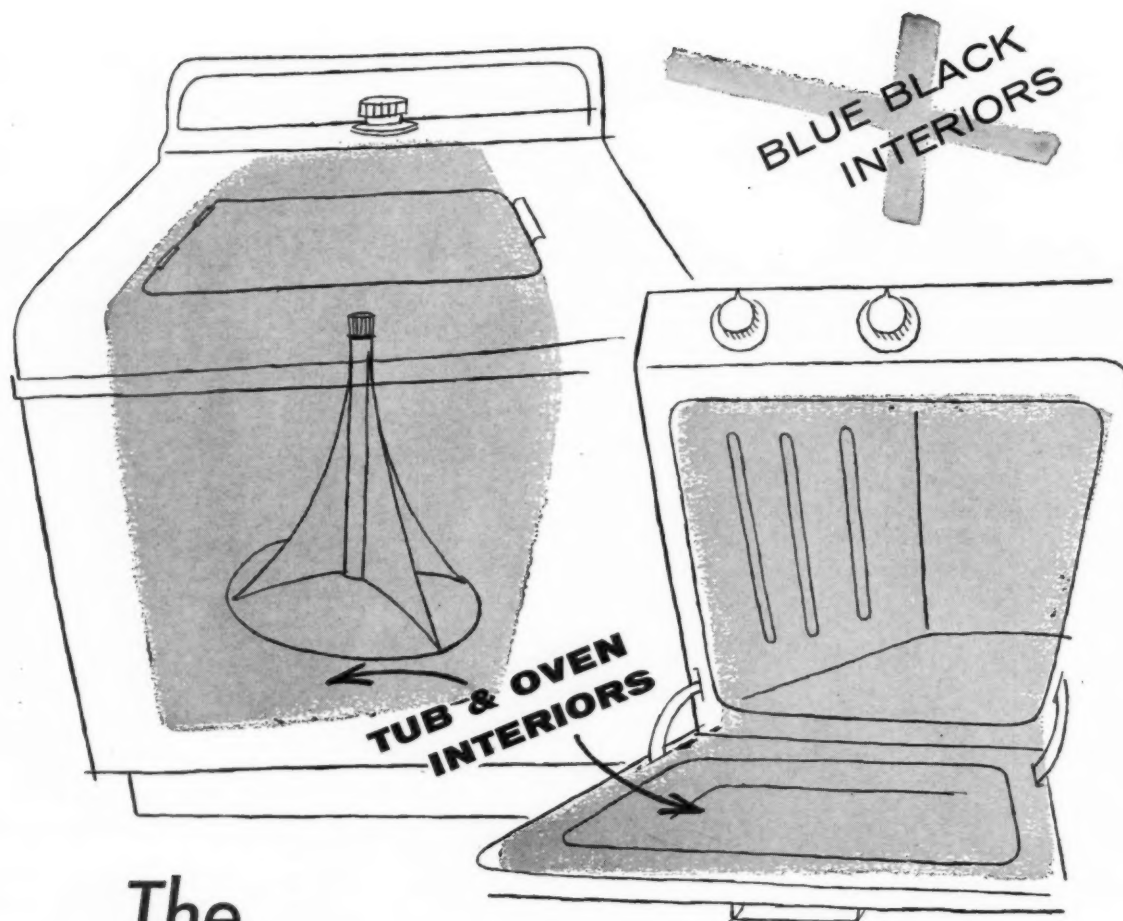
SEND FOR FREE SAMPLER-SELECTOR

Contains 8 actual metal samples, plus specifications and typical uses for Nickeloid Metals.

AMERICAN NICKELOID CO.

PERU 11, ILLINOIS





## The **NEW GRAY** is better...

**Superior alkali resistance  
+ workability + appearance**  
are the principal advantages of the new gray  
vitreous enamel ground coats being used for  
washing machine tubs and stove interiors.



**Trial quantities of OPAX**  
... in new sample packages — are  
now available. A request, on  
your letterhead, to our NYC office  
will be answered promptly.

*Try OPAX as your mill addition opacifier*

**Users of OPAX** as the mill addition opacifier  
are obtaining excellent results. Some report that  
only OPAX gives them these results. It seems  
to give the enamel working properties they  
can not get by any other means.

OPAX is a reg. T. M.



**TITANIUM ALLOY MFG. DIVISION**

**NATIONAL LEAD COMPANY**

*Executive and Sales Offices:*  
111 Broadway, New York City

*General Offices, Works and Research Laboratories:*  
Niagara Falls, New York

manager of the Tappan accounting department.

The promotion of *Otto Krauss* to the newly-created position of director of manufacturing research, effective March 1, was announced by D. W. Alexander, vice president in charge of operations, Whirlpool-Seeger Corp.



EVANS



KRAUSS

In his new post, Krauss will be responsible for coordination and analyses of manufacturing methods, processes, tools, and equipment through the company's seven manufacturing divisions. "We are in an industrial era in which manufacturing research becomes comparable in importance, in terms of cost and quality of the product, to research in the product itself," Alexander stated, in announcing creation of the new position.

Succeeding Krauss as general manager of the St. Joseph Division is *Glenn A. Evans*, whose promotion is also effective March 1. Evans has been general manager of the company's Marion (Ohio) Division since the Division's formation in 1955.

*Jasper F. Burt*, new plant manager at LaPorte (Indiana) Division, has been promoted to general manager of the Marion Division.

*S. J. Smith*, controller for the Clyde (Ohio) Division, will succeed Burt as LaPorte Division plant manager and Smith will be succeeded by *Fred Klein*, who will be promoted from chief accountant to controller at Clyde.



BURT



WILLEY

The board of directors of the American Society of Lubrication Engineers have announced the appointment of *Calvert L. Willey* as administrative secre-

tary for the Society. Willey was formerly associated with the National Society of Professional Engineers as assistant to the executive director.

*C. Benjamin Ramsdell* has been appointed general manager of the General Electric commercial & industrial air conditioning dept., according to Reginald H. Jones, general manager of the air conditioning division. Ramsdell will be located at the division's headquarters at Bloomfield, N. J.

Promotion of three men to positions as executive vice presidents of Philco Corp. was announced by James M. Skinner, Jr., Philco president.

*Joseph H. Gillies* is executive vice president-operations. He was formerly vice president-manufacturing.

*Larry F. Hardy* is executive vice president-consumer products. Hardy recently has been in charge of Philco's consumer products divisions.

*Dr. Leslie J. Woods* was named executive vice president-research and engineering. He was formerly vice president in charge of the same activities.

The board of directors of Whirlpool-Seeger Corp., at a meeting in Chicago recently, elected *Robert Willem* secretary of the firm, according to an announcement by Walter G. Seeger, chairman of the board. Willem, who has been chief patent attorney for the company, succeeds *Edward C. Cudmore*, who continues as controller and assistant treasurer.

*Donald D. Stover* has been placed in charge of development engineering for Recony Corporation's line of gasoline and electric powered mobile air conditioning units.

Appointments to key positions were announced by Harvey E. Hortman, vice president of Baltimore plant operations for Proctor Electric Co.

*Ben Idov* has been appointed plant superintendent, housewares division, and *Al Steinbach*, formerly of Bendix Radio Corp., has joined Proctor in Baltimore as plant superintendent, equipment division.

*A. B. Biddle*, vice president, has been elected to the newly-created position of executive vice president, and *Charles E. Hall* has been named as general sales manager of regional accounts for Hussmann Refrigerator Co.'s wholly-owned sales subsidiary, Hussmann Refrigeration, Inc. *Harry E. Nash* has been named manager of Hussmann Refriger-

ator Co.'s new Haddonfield, N. J. manufacturing plant.

*William D. Fowler* has been named defense contracts director for Whirlpool-Seeger Corp.

Appointment of *J. F. Weiffenbach* as director of research and engineering for Borg-Warner Corp has been announced. For 12 years Weiffenbach was a member of the engineering staff of the Electro-Motive Division of General Motors Corp. in La Grange, Ill., leaving this post in 1946 to become chief engineer of the railroad division of Fairbanks, Morse & Co.

Weiffenbach succeeds *Henry M. Haase*, who recently was elected president and chief executive officer of Borg-Warner's newly-acquired York Division, manufacturer of air conditioning and refrigeration equipment.

*Paul Welchans* has been appointed national service manager for Easy Laundry Appliances, Chicago, it was announced by Parker H. Ericksen, vice president of the firm and The Murray Corp. of America. Welchans and the national service department will now be located at the new Easy general offices in Chicago's Palmolive building. Previous to this appointment, he was national service manager for the Thor Corp.



HEIDENBLUT



KOONTZ

*James G. Koontz* has been named national field sales manager for the company. For the past three years, Koontz has been national field sales manager, and general manager of branch operations, for the Crosley-Bendix Corp.

*George R. Heidenblut* has been elected vice president-engineering of the Midwest Mfg. Corporation subsidiary of Admiral Corporation, it was announced by John B. Huarisa, executive vice president of the parent company. The Galesburg, Illinois subsidiary manufactures refrigerators, freezers, electric ranges, room air conditioners and dehumidifiers.

a small detail yes



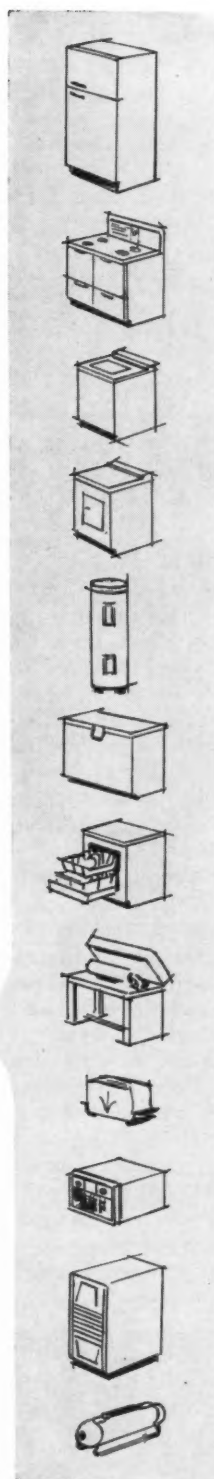
but a vital link in appliance production

## UNIVERSAL SCREWS for

washers, driers, ranges, refrigerators, air conditioners and other appliances

To keep assembly lines running . . . to maintain uninterrupted production schedules, more alert purchasing agents are depending upon Universal for their screw requirements. They've learned from experience that they can buy screws of all types and sizes from Universal at prices that only a manufacturer can give . . . they've learned that they can get immediate delivery from large stocks of standard sizes, and faster production and shipment of "specials".

Buying QUALITY screws from Universal eliminates production bottlenecks. Find out for yourself why Universal Screws are the No. 1 choice of leading home appliance manufacturers.



### UNIVERSAL SCREW COMPANY MANUFACTURERS

precision quality fasteners for the appliance industry

2401 Brummel Pl., Evanston, Ill. — Davis 8-0450, Teletype Evanston, Ill. 1767

SALES OFFICES IN DETROIT, CLEVELAND, MILWAUKEE





## NEWS about Suppliers

### PRODUCTION INSTRUMENT AND GENERAL CONTROLS TO MERGE

Shareholder approval has been obtained for the merger of Production Instrument Co., Chicago, manufacturer of mechanical and electrical counting devices, with General Controls Co., Glendale, Calif., it was jointly announced by William A. Ray, president of the automatic controls manufacturing firm, and Joseph F. Visin, president of the Chicago company.

The transaction involves the purchase of all assets of the counter manufacturer in return for an undisclosed amount of General Controls common stock.

### CHICAGO STEEL INDUSTRY TO EXPAND FACILITIES, REPORT

The Chicago area steel industry will step up its growth rate, and increase its lead as the world's greatest steel center, in the next ten years, Hjalmar W. Johnson, vice president of Inland Steel Co., said recently.

The steel manufacturing chief of the Chicago steel company said that capacity of the area's mills, now rated at 24,000,000 tons a year, will rise to 27,000,000 tons in the next two years on the basis of work now in progress, and jump to 33,000,000 tons or more by 1967. Johnson made the prediction at a meeting of the Blast Furnace and Coke Assn. of the Chicago District in the Del Prado hotel.

### NEW CHICAGO RUBBER FACILITIES

Installation of new production facilities that will enable substantial price reductions as high as 30 per cent to be made on a variety of industrial rubber products was announced by William J. Cosmos, president of Chicago Rubber Company.

Cosmos said the company, which makes industrial rolls as well as contact wheels and rolls for use with abrasive belts, has established production line operations at a newly-equipped plant at

651 Market St., Waukegan, Ill. They formerly were at 2620 Clybourn Ave., Chicago. The firm also maintains custom shop operations.

### 68 MILLION MILES OF TAPE

Tape enough to reach the moon 236 times is represented by the two billionth commercial size roll of tape produced recently by Minnesota Mining and Manufacturing Co., St. Paul, Minn. Shown with the symbolic roll are three of the key men in the growth of the 3M tape business — (l. to r.) W. L. McKnight, board chairman; H. P. Buetow, president; and R. G. Drew, inventor of pressure sensitive tape. The 3M company said the two billionth roll would



be packed in a standard shipping carton and routed through regular distribution channels. The recipient will be awarded 10 shares of 3M common stock, and an expense-paid summer visit to St. Paul.

Hand application was the only method when tape was first introduced in 1925 to mask two-tone autos, while industry now uses taping machines that automatically apply tape at rates up to 300 applications per minute.

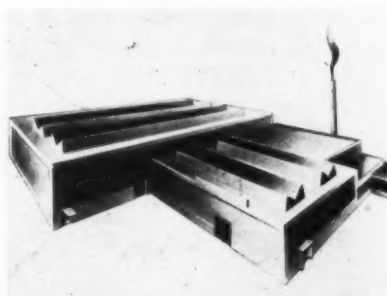
"We have barely explored the potential in this area," E. L. Decker, general sales manager of 3M's industrial tape division, said. "Research now is experimenting with mechanical applica-

tors, fully integrated into production lines, with speeds up to 1,000 applications per minute."

Paint masking still counts as one of the largest uses for pressure sensitive tape. Polished metal sheets for stainless steel cabinets are protected against scratches during fabrication with masks of protective tape, as one of many other plant production applications.

### FOX CO. EXPANDS FACILITIES

Fox Company, ninety-four year old Cincinnati, Ohio, manufacturer, has announced major additions to plant and equipment, according to Frank Fox, vice president and general manager, and grandson of the company's founder.



The company manufactures name plates, emblems, and decorative metal trim at 3400 Beekman St., serving the appliance, automotive, and similar industries.

The accompanying drawing shows the Fox plant where additions to manufacturing facilities and personnel are being made.

### NOMINATIONS NOW OPEN FOR DIE CASTING AWARD

Nominations are now open for the 1957 Doehler Award which recognizes outstanding contributions to the advancement of the die casting art. The Award, consisting of a plaque and cash honorarium of at least \$500.00, is made annually by the American Die Casting Institute, national association of job-shop die casters.

Three considerations govern the Award committee in the selection of the Doehler Award: 1) technical achievement, as measured by significant scientific contributions of a metallurgical or engineering nature relating to the die casting process; 2) advancements in plant operations, of a management or administrative nature, and related to the operational phases of the industry; and 3) other activities, not primarily of a scientific or operational nature, that result in the enhancement

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Photo Courtesy of General Motors Corp.



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Manufacturers of Carbon, Alloy and Yaloy Steel  
General Offices - Youngstown 1, Ohio  
District Sales Offices in Principal Cities

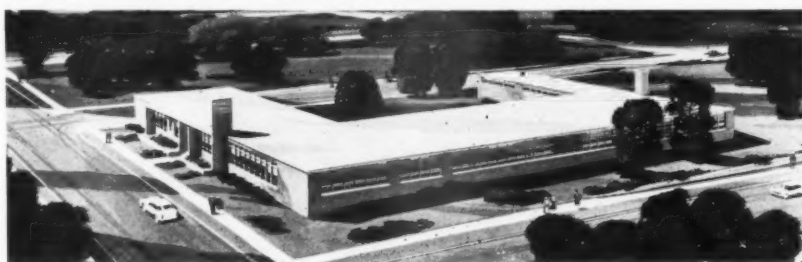


of the reputation and acceptability of die casting. To be eligible for consideration, an achievement in any of the above classes must be generally applicable to the industry.

Nominations for the Doehler Award, along with supporting papers or other related material, should be submitted before April 15, 1957 to Award Committee, American Die Casting Institute, 366 Madison Ave., New York 17, N. Y.

R. L. Meredith, research metallurgist with Federated Metals Division, American Smelting and Refining Co., and an authority on die casting procedures, addressed a meeting of the Society of Die Casting Engineers held on February 5th at the Devon Gables, Detroit, Mich. Meredith's talk concerned "Production of Quality Die Castings," and is part of Federated Metals Division's national program for non-ferrous metal users.

## PEMCO BUILDS NEW HOME FOR RESEARCH DIVISION

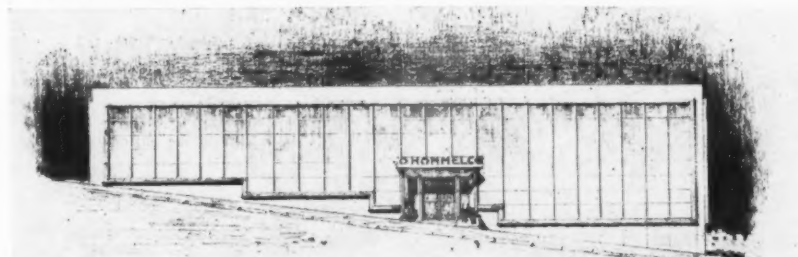


Construction of a new building that will have three times the floor space of its present Research and Development Laboratories was announced by Pemco Corp., Baltimore, Md. The total investment in personnel, equipment, and buildings will represent over half-a-million dollars, the report states. Floor space will encompass 22,000 square feet, and the building has been designed so that new wings can be extended

when further enlarging is needed. In addition to numerous laboratories, the building will have offices, conference rooms, a large library, and will be air-conditioned.

"This expansion is in line with the expanded production of our plant and increased demands on our facilities and personnel," said Dr. George Spencer-Strong, vice president and director of research for Pemco.

## O. HOMMEL CO. TO CONSTRUCT NEW RESEARCH CENTER



Mr. Ernest Hommel, president of the O. Hommel Co., Pittsburgh and Carnegie, Pa., has announced plans for a new porcelain enamel research center, to be completed in the very near future.

A new ultra-modern building will add search facilities, and will be staffed with approximately 16,000 square feet of re-over 25 engineers, chemists, and research technicians, who will work with the latest equipment in the field of ceramic engineering. Special accoutrements will be available for both static and dynamic testing of high temperature protective ceramic coatings. Facilities for testing all types of porcelain enamel will be installed. In addition,

special flame spray equipment will be available for the application of cermits for high temperature engine coatings. A special air conditioned, constant temperature room will house all scientific, analytical, the testing equipment in the new O. Hommel research center.

## RESISTANCE WELDER EQUIPMENT FIELD REMAINS STRONG

Final figures from the Resistance Welder Manufacturers' Association, covering the year 1956, indicate that both new orders and shipments were at a record level.

New business finished 21 per cent

ahead of 1955, and shipments were 39 per cent ahead of '55. Both of these categories represented in excess of \$47 million, according to RWMA.

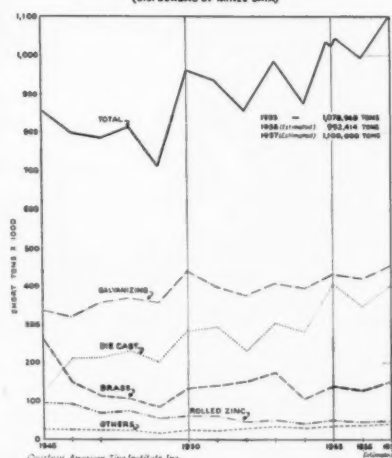
A backlog slightly in excess of \$12,000,000 was reported for 1957.

## PEAK YEAR EXPECTED BY ZINC INDUSTRY FOR 1957

The zinc industry is looking forward to an exceptionally good consuming year in 1957.

According to John L. Kimberley, executive vice president of the American Zinc Institute, Inc., slab zinc consumption in 1957 may well exceed the record set in the industry's boom year of 1955 when total slab zinc consumed reached 1,078,968 tons.

CONSUMPTION OF SLAB ZINC IN THE UNITED STATES  
(U.S. BUREAU OF MINES DATA)



He reported that zinc industry confidence reflects in part the growing market for zinc in die casting, its expanding use in galvanizing of steel, and the integral place it holds in brass manufacture, rubber, and paint formulation.

## CONTROLS CO. OF AMERICA EXPAND AT HOLLAND PLANT

Controls Company of America recently announced an expansion program to increase assembly and fabrication operations at the Nijmegen, Holland plant of its subsidiary, Controls Maatschappij Europa N. V.

The expansion will increase Nijmegen production of vaporizing oil burner controls, refrigeration expansion valves, and home laundry controls for European companies licensed by American appliance manufacturers such as Whirlpool, Westinghouse, General Electric, Frigidaire, and Bendix, Louis Putze, president, said. Controls Company and its predecessors have supplied their



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European markets for the past 20 years on an export basis, he pointed out. The Nijmegen subsidiary was established in the latter part of 1954.

### NEW ACME OFFICE LOCATION

Acme Steel Co., manufacturers of steelstrap, stitching wire, box stitchers, metal stitchers, slotted angle, hot and cold-rolled strip, etc., has announced a new location for its general offices, as of Jan. 1, at 135th & Perry Ave., Chicago. This move completes the consolidation of administration, manufacturing, sales, service, and office facilities in Riverdale, the report states.

### SHARON STEEL TO DOUBLE STAINLESS STEEL CAPACITY

James A. Roemer, vice president of Sharon Steel Corp., and president of Mallory-Sharon Titanium Corp., on January 29 turned the first spadefull of dirt to start construction of a new \$6 million electric furnace facility at the Roemer Works, Farrell, Pa.

When the new furnace goes into operation next year, it will more than double the present 72,000-ton annual capacity of electric furnace steel at Sharon. Output from the new furnace will go into high-alloy, high quality stainless and specialty steels.

### RESISTANCE WELDER CORPORATION BUILDING NEW PLANT



Resistance Welder Corporation reports a new manufacturing plant now under construction in Bay City, Mich., with a new general office and engineering building to be added in the future.

The new plant is scheduled for completion in May, and will provide an ad-

ditional 40,000 sq. ft. of manufacturing area. The center bay will provide for the increasing need for large areas required for assembly and tryout of automated resistance welding and allied equipment often extending several hundred feet in length.

### NEW RESEARCH FACILITIES

Formation of a new research and development division, to work in cooperation with the research laboratories of Aluminum Co. of America, was announced recently by Sullivan Powdered Metals, Inc.

The new division will be devoted exclusively to the development and application of special blends of aluminum

pastes and powders for use as pigments in plastics, finishes, etc., it is stated.

### FEDERATED METALS TO BUILD SECONDARY ALUMINUM PLANT

The Federated Metals Division of American Smelting and Refining Company has announced that it will begin construction of a large secondary aluminum smelter at Alton, Ill. The plant, which will have an annual capacity of

72,000,000 pounds of aluminum alloy ingots, will double Federated's present aluminum alloy production. It will be among the largest plants ever built to handle aluminum scrap metals.

To handle the output of the new smelter, Federated will establish new sales and purchasing divisions at Alton. Sales engineers, specializing in aluminum applications, will cover the midwest and southwest. A special purchasing organization will acquire the large scrap tonnages required, according to Frederick Walker, ASARCO vice president in charge of the Federated Metals Division.

### CARPENTER STEEL OPENS NEW WAREHOUSE IN ST. LOUIS

The Carpenter Steel Company, Reading, Pa., has opened a new and larger mill-branch warehouse in St. Louis, Mo., to service and supply users of tool, stainless and alloy steels in its south-central sales territory.

W. J. Stephens continues as branch manager, and Arthur Hunnius remains warehouse manager. Three sales engineers are assigned to the new warehouse, M. L. Duggins, L. G. McNelly and W. I. Potteiger.

The St. Louis warehouse is operated under the supervision of L. E. Cooney, district manager, and Paul Holtz, assistant district manager; both are located in Chicago.

### AUTOMATIC SPRINKLER CORP. OPENS TWO NEW PLANTS

Two new facilities have been added to its network of regional fabricating plants by the Automatic Sprinkler Corporation of America, Youngstown, Ohio. The company has occupied a 5,000 sq. ft. building at 4810 Corothers Street, Cincinnati 27, Ohio, and early in March will occupy 13,000 sq. ft. of space at Route 202 and Cassatt Avenue in Berwyn, Pa., near Philadelphia.

**HUYCK FURNISHES FIREBRICK MASONRY TO BUILD, REBUILD AND REPAIR ALL TYPES OF: ENAMELING FURNACES . . . FRIT SMELTERS . . . ALUMINUM, BRASS, LEAD SMELTERS . . . FORGE FURNACES . . . HEAT TREATING FURNACES.**

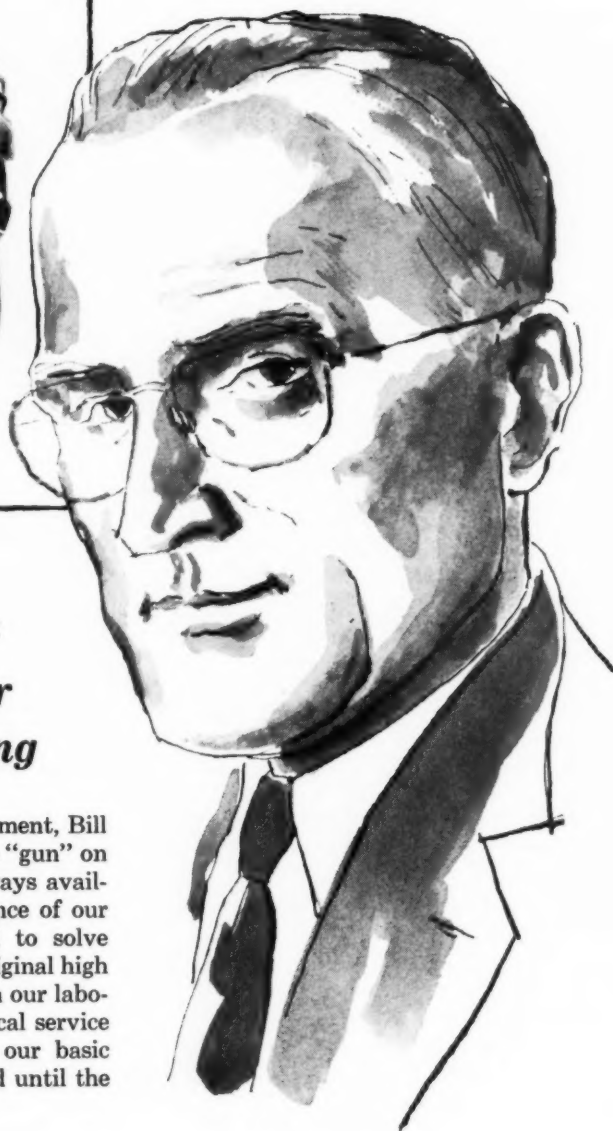
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### GRAND RAPIDS VARNISH CORPORATION

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GRAND RAPIDS VARNISH CORPORATION OF NORTH CAROLINA, High Point, N. C.

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Studios in Grand Rapids, High Point, and Hickory

THE BETTER THE FINISH, THE BETTER THE BUY

## Industry News . . .

→ from Page 64

### AHLMA'S GENERAL COUNSEL GETS FUR-LINED WASHBOARD

George P. Lamb (right), general counsel for the American Home Laundry Manufacturers' Association, Chicago, was presented a fur-lined washboard by the association at a board of director's meeting recently in the Congress hotel, "in appreciation for 20 years invaluable service as legal counsel, guide, and friend." In addition, Lamb received a certificate recognizing his service to the industry. He is a partner in the Washington, D. C., New York, and Chicago law firm of Cann, Taylor, Lamb & Long.

Making the presentation was B. J. Hank, AHLMA president, and president of Conlon-Moore Corp., Chicago.



AHLMA's general counsel gets the fur-lined washboard.

### NATIONAL INDUSTRIAL RESEARCH CONFERENCE SET

The National Industrial Research Conference, sponsored by the Armour Research Foundation, is scheduled to be held at the Conrad Hilton hotel, Chicago, April 24-25.

### PAINT SHORT COURSE AT PURDUE

A Short Course in Paint and Varnish Technology will be offered by the School of Chemical and Metallurgical Engineering at Purdue university from June 24 thru 28.

The main topics to be covered in the course will be: I—Processing Steps in the Manufacture of Finishes and Resins; II—New Technical Developments in Resins, Oils, Solvents, Pigments, Driers, Testing Methods, and Customer Specifications; and III—The Protective Coatings Industry. Lyle F.

Albright, associate professor of chemical engineering at Purdue, has announced that one of the guest speakers at the course will be Dr. James S. Long, of the Speed Scientific School at the University of Louisville.

For further information, MPM readers should contact Professor Albright at Purdue university in Lafayette, Ind.

### CONFERENCE ON ELECTRONICS IN INDUSTRY SCHEDULED

The Conference on Electronics in Industry, sponsored by the Armour Research Foundation and Professional

Group on Industrial Electronics, Institute of Radio Engineers, is scheduled to be held at the Illinois Institute of Technology campus, Chicago, April 9-10.

### NEW ADMIRAL CREDIT CORPORATION FORMED

Admiral Credit Corp., a wholly-owned subsidiary of Admiral Corp., has been formed to handle the financing of dealer purchases throughout the country. The organization ultimately will finance consumer purchases as well. C. R. Overholser has been appointed vice president and general manager.

## FOR THE MANUFACTURERS WHO CAN AFFORD ONLY THE MOST ECONOMICAL TRIM PARTS

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because we are experts in working out your problems and making recommendations. All we require to work with is a drawing or a rough sketch along with your specifications.



## LIGHT metals corporation

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1223 Monroe N.W. Grand Rapids 5, Michigan



## Magnetic testing

→ from Page 27

The second of the open-circuit test methods utilizes the flux emanating from the legs or poles, or part of the leakage flux. The coil, or coils, are located at a fixed position in relation to the magnet, and a portion of the flux produced is measured. The many "channel-type" magnets used in canning machinery are tested in this manner. The lines of flux coming from the pole faces are a measure of the holding power of these magnets.

Since the demagnetization curve for Indox I magnets is essentially a straight line, one-point testing at almost any point will be sufficient to guarantee quality. Quality variations are normally parallel to the standard curve. Open-circuit testing, consequently, will usually suffice. Indox TV focus rings, magnet holding assemblies and door latches are tested in this manner.

### Fixture tests

Test fixtures have soft steel sections in the magnetic circuit (see Fig. 5). They range from simple "pull-off" tests to those which utilize the pole pieces of product assemblies. In the latter case, the coil is placed not only where it is convenient for production testing, but, more important, where it will give an accurate correlation of results expected in the production units.

### "Pull-off" tests

In one type of pull-off fixture test, the magnet is magnetized in place on the test pole pieces. The unit is removed from the magnetizer and the fluxmeter is zeroed. The magnet is then removed from the fixture and the resulting deflection is noted. A considerable number of permanent magnets used in indicating-meter applications are tested in this manner, since this method gives results that are comparable to the performance of the magnet in the meter.

A second type of "pull-off" test follows the procedure outlined except that the magnet is magnetized, removed from the magnetizing blocks, and placed on the test unit. The open circuiting of the magnet after it is magnetized and prior to testing gives a stabilizing effect present in such applications as holding magnets. The soft steel fixture may, or may not, have an air gap, and the coil is usually wound around the steel portion of the circuit. The lines of flux passing through the steel give a good indication of the holding power of the

magnet. Adjustment of this testing apparatus usually consists of varying the size and shape of the steel circuit or changing the air gap configuration. *The gap may be air or any other non-magnetic material, such as brass, copper, wood, or plastic, all of which have the same effect as air on lines of flux.*

### "Pump handle" test

Another type of test fixture, shown in Fig. 6, is known as the "pump handle," because of its resemblance to an old-time water pump. The handle activates a movable plunger which permits the magnet to be inserted into the magnetic circuit. The pole pieces that contact the magnet can be varied in size and shape and spaced so as to give different test conditions. The test and magnetizing coils are usually part of the complete fixture. This unit lends itself to automatic testing and is largely used for testing radio and television loudspeaker magnets, television focusing and deflection units, and similar applications.

### "Two-point" test

A two-point test machine, together with built-in magnetizing and stabilizing coils and the necessary meters, resistors and switching arrangements, may be used in determining the performance of permanent magnets used in motors, magnetos, and generators. And, as discussed, adjustments in air gap and pole piece structure will provide varying conditions of testing which are standardized for each case. This is done so that the operating slope of the magnet in the test unit is the same or approximately the same as that found in the customer's assemblies.

### Hysteresis curve tracer

Much has been said about permeameter test methods. This unit and an oscilloscope can be used as a hysteresis loop tracer giving the actual shape of the demagnetizing curve. This method of testing is satisfactory for research and extremely precise laboratory work, but is not normally adaptable, or suitable, for production testing. However, a simple modification of this device can be used successfully to check Cunife and Alnico magnets of long length and small diameter which cannot be tested conveniently by other conventional methods.

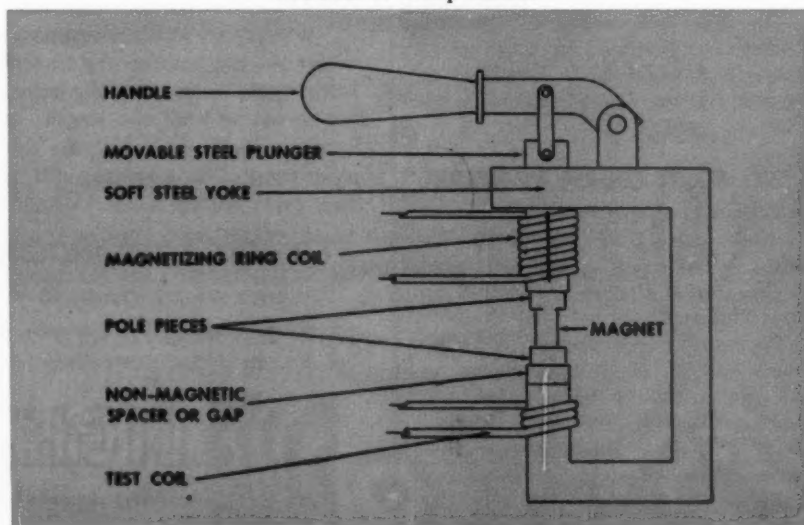
### "Knock-down" tests

There are other devices which are used to give the properly saturated magnet a pre-determined stabilization or "knock-down." It is important that the current in the stabilizing coil be kept constant and that the magnet be located in a fixed position in relation to this coil during the "knockdown." A number of magnets used in watt-hour meters are tested with a stabilization corresponding to that expected in normal service. This assures users that the magnet will function properly in the field and will not be adversely affected by sudden or large-power surges or any other stray magnetic fields.

Another interesting test unit is constructed from the actual watt-hour meter assembly. A fixed amount of current causes the disc to rotate. Stroboscopic effect indicates whether the resultant drag (eddy current effect) on the disc by the properly positioned stabilized magnet is greater or less than that produced by the reference standard.

to Page 84 →

FIGURE 6. Pump handle.



*Now... an old friend  
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Hudee, the original clamp-down frame system for built-in sink bowls, now makes Hudee frames for manufacturers of flush-type built-in ranges.

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*Write for Complete Information*



**NATIONAL LOCK COMPANY**

Rockford, Illinois

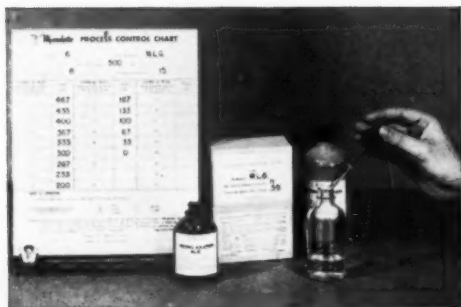


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- Metal Cleaners • Paint-Preparation Products • Barrel-Finishing Compounds • Paint Removers • Aluminum Specialty Products • Neutralizers • Rust and Scale Removers • Rust Preventatives



# Wyandotte CHEMICALS

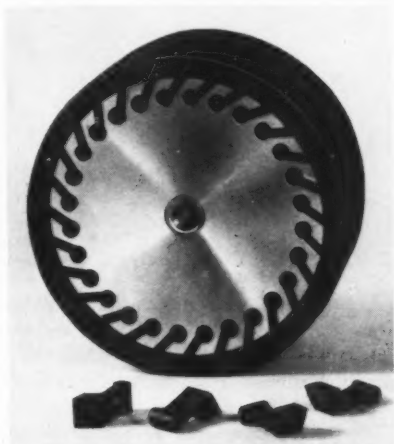
J. B. FORD DIVISION

THE BEST IN CHEMICAL PRODUCTS FOR METAL FINISHING



## Supplies and Equipment

### EXPANDING GRINDING WHEEL HAS INTERCHANGEABLE SEGMENTS

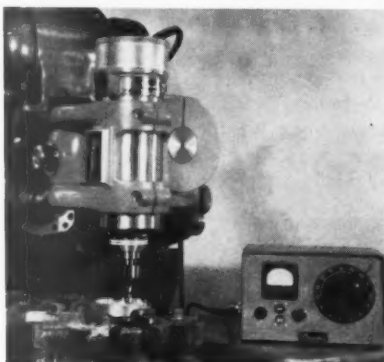


A series of separate, replaceable rubber segments, which grip the coated abrasive and form the grinding surface of the "Flexcore" grinding wheel, provide two distinct operating advantages, according to the manufacturer. First, as segments become worn or damaged, they can be replaced singly, or in groups, at a very low cost. The core never needs to be replaced. Secondly, segments are available in a variety of hardnesses, and so can be used in any combination to attain different cutting actions. The wheel is designed so that complete peripheral contact is made with the coated abrasive band. Wheel diameters are 3, 4, 5, and 6 inches. (Check No. X401 on Service Coupon)

### HIGHSPEED POWER QUILL

A heavy-duty power quill has been developed, according to the manufacturer, which will supply a full 1½ hp at the quill, and provides continuously variable speeds ranging from 7,000 to 25,000 rpm. A compact electric speed control with a simple dial permits easy selection of the exact speed desired. The control provides a voltmeter calibrated in rpm, master switch, pilot light, and a fusetron for overload protection. Standard equipment includes a super-precision collet chuck with capacity to ½ inch, and also available is a solid quill extension accommodating wheels with I. D. up to ½ inch and 2½ inch

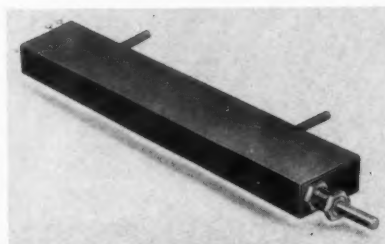
O.D. Specially designed mounts, either plain or universal types, are offered by the manufacturer to permit easy mounting on larger standard machine tools such as milling machines, tool and cutter grinders, lathes, surface grinders, etc., in single or multiple operations.



(Check No. X402 on Service Coupon)

### CONTINUOUSLY VARIABLE DELAY LINE INTRODUCED

A continuously-variable delay line, model 403, for use as a component, or as test equipment in advanced computer and radar systems, has been developed. The unit offers the maximum in application flexibility, according to the manufacturer, and the entire delay



range, from zero to maximum, is covered by a single control shaft in ten turns. The unit may be locked.

(Check No. X403 on Service Coupon)

### PERMANENT TANK MAGNET

Separation of iron from nonferrous metal chips, and recovery of pieces lost in plating tanks and clinging in corners of plating barrels, is afforded by multiple unit tank magnets. The gang of permanent magnets is designed to cover large tank areas quickly, and to pick up parts from the bottom without stirring up sediment. Moving the magnets through metal cuttings picks out iron and steel from brass, copper, zinc, aluminum, and other non-ferrous chips. The unit is available with one to three magnets, with or without support wheels. Standard overall length is 42".

(Check No. X404 on Service Coupon)

### METAL PRODUCTS MANUFACTURING

York Street at Park Avenue  
Elmhurst, Illinois

MARCH

Please forward to me at once information on the new supplies and equipment and new industrial literature as enumerated below:

X401	968	973		
X402	969	974		
X403	970	975		
X404	971			
967	972			

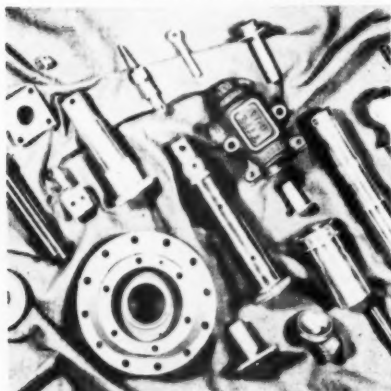
Name \_\_\_\_\_ Title \_\_\_\_\_

Company \_\_\_\_\_

Company Address \_\_\_\_\_

City \_\_\_\_\_ Zone \_\_\_\_\_ State \_\_\_\_\_

## PRECISION COLD HEADED AND SCREW MACHINE PARTS



A large variety of hardened and ground cold headed and screw machine products made to extremely close tolerances are being offered. All parts are made under Air Force bonded stock control. Standard working tolerances of .0001" are common with many lots, the manufacturer reports. Under this new program, hardware is made to customer specifications from aluminum, brass, bronze and different types of plated and unplated carbon, alloy and stainless steels. Some of the items available include appliance and automotive parts, special bolts of many types, sleeves, cylinders, micronic filters, and all types of precision control valves.

(Check No. 967 on Service Coupon)

## STRIPPABLE PAINT BOOTH COAT

A paint booth coating that strips off in large pieces in seconds has been introduced. Applied by either spray or brush to dry booth surfaces, the new material is said to dry fast and to cling tightly to vertical surfaces under paint over-spray. When painting has been completed, it peels off readily with a minimum of prying with a knife and a minimum of shredding. It is said to have the consistency of paint, to be odorless, non-toxic, and non-hazardous to store and use.

(Check No. 968 on Service Coupon)

## METALLIC COATING PREVENTS ENAMEL PEEL FROM GALVANIZE

Developed, a new metallic coating which, it is claimed, will positively prevent paints, lacquer, enamel or other siccative coatings from peeling off the surfaces of galvanized metal. The company says the new coating makes it absolutely unnecessary to use any other metal or priming agent of any kind on galvanized metal. Colorless, non-flam-

mable and odorless, it may be applied by brush or a cloth saturated in the solution. It may also be used to excellent advantage as a bath in which to dip the product to be coated. Field and laboratory tests show that the metallic coating reacts on soldered joints the same as on a galvanized surface and may be soldered over the finish. A sample bottle with sufficient quantity to cover 40 square feet is available on request.

(Check No. 969 on Service Coupon)

## PACKAGING, CARLOADING GUIDE

A new packaging and carloading guide has just been published. This handy, 48-page booklet tells how to package and carload for maximum product protection at minimum cost. Whether shipment is done in cartons or on skids, loading done in closed or open top freight cars, this booklet will be of value.

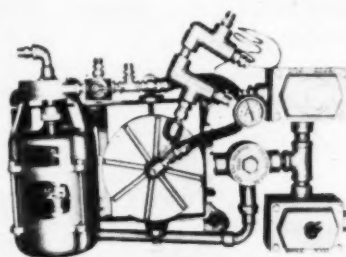
(Check No. 970 on Service Coupon)

## RUST, PAINT REMOVER

A highly concentrated new type alkaline rust and paint remover has been developed that can remove paint, phosphate coatings, rust, oil and other soils in a fast "one step" operation. It may be used in ordinary mild steel equipment and greatly reduces the number of operations normally required to obtain clean, rust-free metal surfaces. Unlike pickling solutions, it does not give off any obnoxious corrosive fumes.

(Check No. 971 on Service Coupon)

## DIAL TEMPERATURE CONTROL FOR HOT SPRAY HEATERS



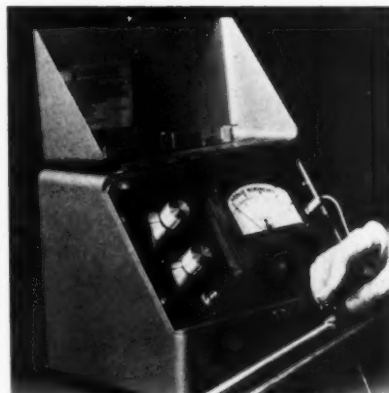
An external dial temperature controller for hot spray heaters has been introduced. Any desired temperature in a 90° to 170° temperature range can be dialed. An accurate sensing element reads fluid temperature and controls within a plus or minus two degrees. The controller is explosion proof and is factory installed with the required heater.

(Check No. 972 on Service Coupon)

(See Service Coupon on Page 81)

## LINE SURFACE FINISH INSPECTION

The Surfindicator weighs fifteen pounds and can be moved to any part of the plant quickly and conveniently. It is used to measure surface roughness



of metal, plastics, glass and vitreous ware, ceramics, paper and other materials. Because it is designed as a portable instrument, it has been built to high standards of ruggedness and strength. The dial is calibrated in terms of the new ASA specifications, and the Surfindicator can be used on flat or curved surfaces, or to measure the internal finish of bores.

(Check No. 973 on Service Coupon)

## PERMANENT MAGNET BOOKLET

A basic analysis of permanent magnetic properties and the importance of engineered applications is given in a booklet now being offered. The book is profusely illustrated with photographs, dimension drawings and charts on the various industrial magnets such as plates, sweepers, separators, drums and pulleys, grids, troughs and filters. More specialized magnets such as textile, magnetic racks, offsets and adapters, plastic, roller channels, etc., are also shown and described. A file tab with complete indexing by types of magnets makes the catalog a handy reference source for engineers, purchasing agents and executives concerned with magnetic application.

(Check No. 974 on Service Coupon)

## BORON CARBON RESISTORS

Comprehensive data on construction, applications, types, tolerance, resistance element, terminals, insulation, dimensions, performance, characteristics, etc., detailed charts and graphs. 4 pages.

(Check No. 975 on Service Coupon)

## SUPPLIER PERSONALS

(Continued from Page 17)

area, and **Bob Goltermann** is now sales representative in the Northern area, including Chicago and the states of Michigan and Wisconsin.

**Robert T. Bailiff** has been named sales promotion manager of L. O. F. Glass Fibers Co.

The appointment of **Robert P. Kelley** as vice president of sales for Tuttle & Kift, Inc., manufacturer of electric heating elements, was announced by John A. Sullivan, president, following a meeting of the board of directors.

Kelley has had experience in the appliance field with Westinghouse Corp., Mansfield, Ohio, and General Mills.

At the same time, Sullivan announced the appointment of **Blaine E. Beck** as vice president of manufacturing for the Ferro Corp. subsidiary. Beck was plant manager of the Electronic Components Department, General Electric, Auburn, N. Y., and earlier served as chief industrial engineer for International Resistance Co., Philadelphia, Pa.



KELLEY



BECK

**Richard G. Griffoul** has been named manager of manufacturing of The Paterson Foundry and Machine Co., it was announced by C. W. Gerster, president. Griffoul had been works manager of General Electric's Gearmotor and Transmission Components Department in Paterson, N. J.

**Jack Hyland**, Chicago manager of the United States Borax & Chemical Corp., Pacific Coast Borax Company Division, has retired effective Feb. 1. He joined the Pacific Coast Borax Co. in 1902, and was with them in the Chicago territory the entire time. **Warren Coray**, district sales manager of the Cleveland office for the past five years, succeeds Hyland, and will have charge of both the industrial sales department district office in Chicago, and warehousing.

**William J. Rothemich** has been elected a vice president of Interchemical Corporation, manufacturer of industrial finishes, packaging and publication inks, textile colorants, and other chemical coatings. Rothemich has been divisional president of both the R-B-H Dispersion Division and, most recently, the textile colors division. He joined Interchemical in 1933.

Radio Frequency Co., Inc., Medfield, Mass., has appointed **Robert Wallace Stokes** vice president, according to an announcement by Joshua Manwaring, company president. Stokes has been with Radio Frequency Co. since 1950 and, according to Manwaring, has been primarily responsible for expansion of the company's sales during that period. He is a pioneer in the application of Induction Heat, and has developed a number of new uses and techniques in that field.



STOKES



STINE

**Victor F. Stine** has been elected president of Pangborn Corp., Hagerstown, Md., manufacturers of blast cleaning and dust control equipment. Concurrent with Stine's appointment, **Ralph M. Trent** assumes the duties of a director and executive vice president, and **W. O. Vedder** was elected a vice president.

**George C. Stineback**, general sales manager of Polyken Industrial Tapes, was advanced to director of sales of the Chicago Division of The Kendall Company, effective January 1st. In his new responsibility, Stineback will be responsible for all marketing operations of Polyken, Bauer & Black, Bike Web, Blue-Jay, Andrews-Alderfer, and Bauer & Black International, which comprise the Chicago Division of The Kendall Company.

**J. J. Stahl** has been appointed assistant regional manager for the Eastern District of the A. O. Smith Corp. Stahl formerly was sales manager for electric motors in the company's Pacific Coast District, also having served as integral horsepower motor sales manager nationally.

Two new administrative posts have been created at Wolverine Tube, Div. of Calumet & Hecla, Inc. **L. G. Fox** has been named manager of products and **H. A. Harty**, manager of advertising and sales promotion.

**Victor H. Remington**, manager of the Washington, Pa., plant of B. F. Drakenfeld & Co., Inc., has been made a director of the company.

Remington was elevated to the vice presidency in 1954. He has been with the Drakenfeld company since he received his M.S. degree in chemistry from Oklahoma A. & M. College in 1928.



REMINGTON



BENJAMIN

**Howard W. Benjamin** has joined the Claude C. Slate Co., Glendale, Calif., as consultant on the "Flotrusion" process development program, according to Claude C. Slate, president.

"Flotrusion" is the trade name of a fabricating process recently developed by the Slate Co., for cold flowing various metals into tubular forms for all shapes and sizes.

Benjamin was formerly group engineer in charge of the production methods group at Lockheed Aircraft Co., for eight years, and production engineer for Curtiss-Wright Airplane Division.

At a recent sales meeting of Jensen national representatives, Frank Jensen, president of Jensen Specialties, Inc., Detroit, Mich., announced the following appointments: **Ben Milt**, sales manager; **John J. Casey**, chief engineer; and **Bruce S. Stewart**, factory sales engineer.

Appointment of **Howard A. Shelley, Jr.**, as industrial sales manager in the Los Angeles district for The Glidden Company's paint division was announced by A. D. Duncan, Glidden vice president, and general manager of the division. In his new capacity, Shelley will direct all functions of sales management in the L. A. District, including those of organization and administration. He will be responsible for the building of sales through qualified representation and servicing of industrial customers and prospects.





Corrosion is the arch enemy of your product's paint finish ... it is the direct cause of peeling, flaking and unsightly stains. With Paintbond you can effectively (and economically) foil the demon rust for a lifetime regardless of the conditions under which the product is normally used!

Paintbond is a zinc-iron phosphate coating, applied directly to the metal prior to painting. Applied by either dip or spray, Paintbond provides a moisture-proof fine-grain crystalline coating which is chemically interlocked with the metal surface. When paint is applied over it, the paint flows into the microscopic crevices between the crystals and is securely interlocked with the metal.

Paintbond thus puts an end to peeling and flaking, thoroughly seals the metal from moisture. Even when the paint is scratched through, Paintbond confines rust to the exposed metal only! No more spreading rust or ugly stains around the scratch.

Important, too, is the fact that Paintbond will impart a far more lustrous, attractive surface to your paint finish and thus increase sales appeal as well.

If you paint your product it will pay you to investigate the advantages of Paintbond. Mail the coupon below or call the nearest Detrex sales office for full particulars.

☐ Send me complete information on Detrex Paintbond.

NAME \_\_\_\_\_

COMPANY \_\_\_\_\_

ADDRESS \_\_\_\_\_

CITY \_\_\_\_\_ ZONE \_\_\_\_\_ STATE \_\_\_\_\_



**DETREX**

CHEMICAL INDUSTRIES, INC.

BOX 501, DETROIT 32, MICHIGAN

Dept. A-1207

## Magnetic testing

→ from Page 78

This indicates good or poor quality magnetics.

In the test methods discussed up to this point, the indicating instrument is usually a fluxmeter. However, for more accurate work a ballistic galvanometer can be employed in production testing. This type of instrument can be used effectively for testing magnetron magnets. In these magnets the flux density is checked with a special coil in the gap of the pole pieces which, in some cases, are actual components of the tube. Due to its critical nature and the expense of a complete tube, this type of test insures radar manufacturers that only good quality magnets will be shipped.

### "Pull" Tests

Pull or lift tests can be made under direct-contact conditions or at a gap. The testing force should always be normal or at right angles to the contact surface, or a shearing effect will be had. Care must be exercised with direct-contact tests to see that a smooth, soft steel keeper of sufficient cross-section is used and that the magnet pole faces are in good contact. This will prevent saturation and variation of test results. Holding magnets used in wheel alignment gages for automobiles may be tested in this manner.

In lift tests the magnet should be centered on the lift block to insure that the lifting rather than the sliding force will be measured.

Readings obtained with pull or lift tests at a gap may be more easily repeated (since the factors which affect good direct contact are not as important at a gap). A spring scale with a proper keeper, or a steel block having a specified non-magnetic gap can be used. Magnets used in torque-transmitting applications may be tested in this manner and, while final results are not exactly the same as obtained in actual operation, a very good correlation can be observed. Pull and lift tests at a gap can also be used to test magnets used in burglar alarm units.

Certain cast and sintered magnets, such as are used in snap-action, thermostatic temperature regulators for home heating, electric blankets, heating pads and numerous industrial uses are usually too small to give pull values or flux readings that may be accurately read. Consequently, a bottle test is used. This unit consists of a steel spool or bar resting on a non-magnetic adjust-

ment block within a glass bottle. The gap between the spool and the bottom of the bottle is varied until a minimum-reference standard magnet attracts and lifts the spool. Subsequently, magnetized magnets either will or will not lift the steel spool, indicating good or poor magnets.

Inspection test methods are founded

on sound magnetic principles. The end use of the products in most cases determines the method of testing. Improperly magnetized magnets will give misleading results just as will improper test methods. Basic equipment for testing is a search coil and an indicating instrument; however, to reflect actual operating conditions it is sometimes

necessary to resort to testing methods which may be more complicated. It is hoped that this article will give some insight into the problems that are encountered in selecting a test method which insures that permanent magnets will meet the quality standards established by the user.

## INDUSTRIAL HEATING EQUIPMENT ASSOCIATION ELECTS OFFICERS



*Directors of IHEA (l. to r.) are: W. H. Holcroft, pres.; G. W. Tall, Jr., W. E. Benninghoff; C. F. Olmstead, v. p.; A. R. Robertson; Carl L. Ipsen, exec. v. p.; R. L. Harper; J. H. Sands; L. B. Rosseau; and E. E. Staples.*

Walter Holcroft, executive vice president of the Holcroft Company, Detroit, was elected president of the Industrial Heating Equipment Assn. at its annual meeting in Washington.

C. Floyd Olmstead, president of the Lee Wilson Engineering Company, Cleveland, was named vice president, Carl L. Ipsen, Washington, was re-elected executive vice president of IHEA and Ralph E. Whittaker, secretary of the Swindell-Dressler Corporation, Pittsburgh, was re-elected treasurer.

New members of the Board of Directors include: A. E. Tarr, assistant to the president, Leeds and Northrup Company, Philadelphia; A. R. Robertson, president, Wayne Industrial Furnace Company, Detroit, and R. L. Harper, executive vice president, Harper Electric Furnace Corporation, Buffalo.

The Association also adopted a seal for use by its member companies.

Approximately 75 top industry executives attended the two-day sessions held at Washington's Shoreham Hotel. Among the speakers were Dr. George Terborgh, research director of the Machinery & Allied Products Institute, who spoke on "Tax Depreciation Policy"; Dr. Forrest Kirkpatrick, assistant to the president, Wheeling Steel Corporation, who spoke on "The Larger Functions of Management"; James M. Dawson,

vice president of the National City Bank of Cleveland, who discussed "A Crystal Ball Look at Business"; and N. A. Olsen, deputy director, Metalworking Equipment Division, Business and Defense Services Administration, U.S. Department of Commerce. Mr. Olsen outlined the activities of his division, with special reference to a proposed census of industrial heating equipment manufacturers.

A special appropriation was passed by the Association for cooperating with the Department of Commerce in preparing a census of Industrial Heating Equipment Association manufacturers.

## REINFORCED PLASTICS INDUSTRY REPORTS 30% GAIN 1955-1956

**R**EINFORCED plastics that survived atomic blasts and supersonic speeds shared the spotlight with an impressive array of new mass-production items at the 12th Annual Exhibit and Conference of the Reinforced Plastics Division of the Society of the Plastics Industry held at the Edgewater Beach Hotel, Chicago, Feb 5-7. The three-day conference, open both to SPI members and nonmembers, attracted over 1200 representatives of business and industry from every state, Canada and 10 other countries.

More than 7,000 streamlined supermarket checkout counters have been produced, it was learned, with a complete unit being molded every 2½ minutes of production time. Reinforced plastics housings were much in evidence at the exhibit, with Admiral record players, Victor adding machines and Pitney-Bowes parcel post scales as typical examples.

Industry reports show that close to 140,000,000 pounds of reinforced plastics were consumed in 1956. This represents a 30 percent gain in sales over 1955, and the forecast is for an equal percentage growth in 1957.

In the appliance field, accessories and air conditioning housings accounted for important additional poundage of premix molding compounds. All major car manufacturers reported increased use, with cars and trucks using 8 percent of total production. Aircraft used 20 percent of total poundage, the construction field 16 percent, and boats moved up to account for 16 percent.

An estimated half of the 20 percent Miscellaneous figure comprises premix and molding compounds going primarily into automotive, appliance and electrical parts. A substantial part of the remaining Miscellaneous poundage was accounted for by pipe and tooling. Jigs, fixtures and tooling are growing in volume as they are put to use in more diversified industries.

The SPI division reported that while polyester resins comprise the bulk of the resin employed in reinforced plastics, other resins are assuming greater importance. These include epoxy resin, low pressure phenolic, polystyrene, silicones, melamine, vinyl.

A breakdown of the 140,000,000 pound sales figure for reinforced plastics in 1956 shows resins accounting for 70,000,000 lbs. of the total; reinforcements and fillers for the remaining 70,000,000 lbs. As for the types of resins used, polyesters comprise an estimated 65,000,000 lbs. of the 70,000,000 lbs resin total. Of the remaining 5,000,000 lbs. of resin, close to 4,000,000 lbs.

*continued, with statistics on Page 98 →*



On modern  
refrigerators...

New G-E Wall Refrigerator-Freezer  
puts all foods at your eye level.

## DULUX® meets the exacting requirements of today's topflight manufacturers



### "DULUX" ENAMEL

Better Things for Better Living . . . through Chemistry

**America's leading  
home-appliance finish**

Over 53,000,000 major home-appliance units now in  
service are finished with Du Pont DULUX Enamel.

LEADING APPLIANCE MANUFACTURERS know that durable Du Pont DULUX is a finish of *consistent* quality. Every shipment of this fine finish meets the *same* rigid specifications. And that's just one of the important cost-cutting, sales-winning advantages that DULUX offers.

Constant research by Du Pont chemists has resulted in a finish that gives more rugged resistance to chipping, cracking, scratching and staining. Application costs are lower, too—without sacrifice of quality appearance and dependable performance.

DULUX keeps its flawless appearance after years of constant use in the home. Its easy cleanability, resistance to wear and long-lasting whiteness help build the continued customer satisfaction so vital to the success of any appliance line. *No wonder so many of today's topflight appliance manufacturers use Du Pont DULUX Finishes.*

E. I. du Pont de Nemours & Co. (Inc.), Finishes Div., Wilmington 98, Del.



## The role of oxygen in iron-enamel adherence

(Continued from Page 36)

The cobalt ions present in the coating layer tend to plate out of the molten enamel electrolyte onto the more electronegative areas of the iron surface as metallic cobalt. The tiny galvanic cells thus formed cause selective etching of the iron surface if the specimen is fired in an atmosphere containing a sufficient amount of oxygen.

Little or no selective etching will

occur where there is insufficient oxygen present to promote the corrosion of the exposed areas of the iron. However, the oxygen required for the corrosion process does not necessarily have to come from the furnace atmosphere. If easily reducible oxides are present in the coating layer, then selective corrosion of the iron can still occur even in a furnace that is substantially oxygen free.



(from left, front row) C. J. Schmidt, executive vice president; F. W. Partsch, vice president and manager, Boston office; J. O. Ross, chairman of the board; S. W. Fletcher, president; and W. K. Metcalfe, vice president in charge of sales. (From left, back row) L. G. Janett, vice president and manager, Chicago office; H. G. Rappolt, vice president, engineering; R. W. Morsch, manager, Los Angeles office; R. W. Grott, manager, Seattle office; C. R. Herter, manager, Detroit office; and Howard H. McCall, manager, Atlanta office.

There is evidence, however, which indicates that interface roughness does not completely account for adherence: poor adherence has been observed on very rough interfaces. Also, fairly good adherence has been obtained on alloys without surface roughening. Although the observations made in the present study can be explained on the basis of the galvanic corrosion theory, further work is needed to uncover, and to isolate, the other active mechanisms in the adherence of vitreous coatings to metals.

## SUPPLIER NEWS

### ROSS DEPARTMENT HEADS MEET

On Feb. 1, at the company's main office, 444 Madison Ave., New York, J. O. Ross Engineering Company held a meeting of all its departmental heads and branch office managers to discuss plans for making available Ross engineering and service personnel, as well as manufacturing facilities, to two companies in allied fields recently affiliated with the Ross firm. Shown in photo are:

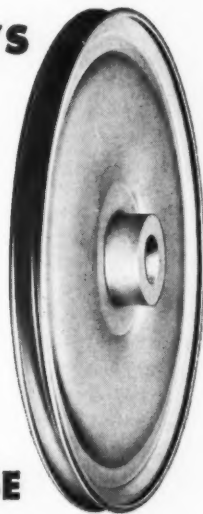
## PORCELAIN ENAMELING CAPACITY AVAILABLE

Due to recent product transfers, we have a completely equipped porcelain enameling department available for volume processing of your enamel ware. Equipment comprises two continuous type electric furnaces, conveyorized automatic ground and cover coat spray lines, pressurized spray booths, dryers, sandblast, mills, etc. We can enamel both steel and cast iron. We can also fabricate and weld your enameled parts. If you are seeking a porcelain enameling source, your inquiries and inspection are invited.

**Plant Manager,  
FLORENCE STOVE COMPANY  
Lewisburg, Tennessee**

## V-BELT PULLEYS

Lighter  
Stronger  
Less Costly



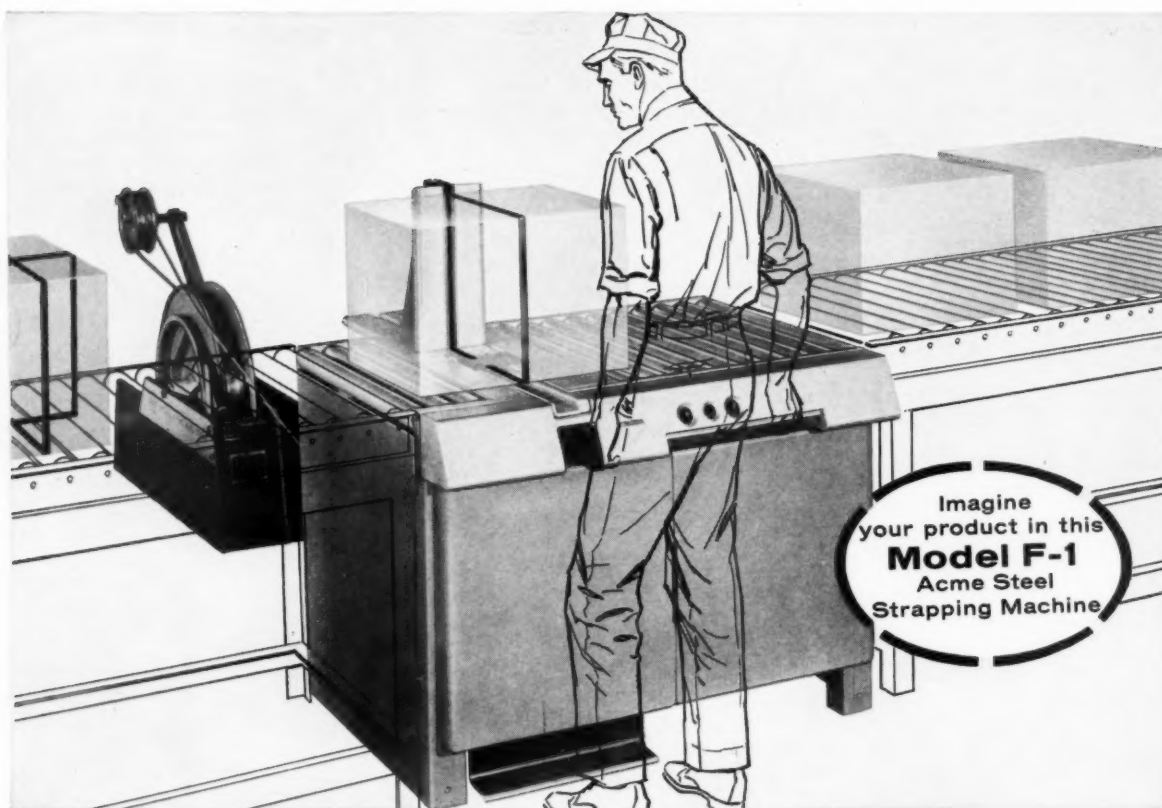
by **NAGEL-CHASE**

If your appliance incorporates a V-Belt, consult Nagel-Chase about pulleys. They're light weight, welded construction, come in sizes to 14", and are ideal for automatic washers, refrigerators, dryers, air conditioners and similar appliances.

You may be able to cut production costs — write today for complete information.

### The NAGEL-CHASE MANUFACTURING CO.

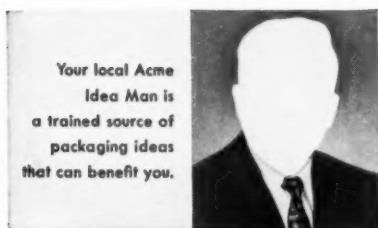
2817 North Ashland Avenue, Chicago 13, Ill.  
Manufacturers of Nagel-Chase Casters  
and V-Belt Pulleys



Line up your AIM\*. . . others find it pays . . .

**Let this idea machine break packaging bottlenecks**

**YOUR ACME IDEA MAN** can prove to you, as he has to others, how the Acme Steel F-1 Strapping Machine breaks high volume packaging bottlenecks. This Idea machine, designed for straight line packaging procedures, speed-applies steel strapping to help you ship your products in safe, secure, tamperproof, economical packages. And its fast, push-button operation lets even intermixed package size variations flow from production line to transportation with no delays for machine adjustments.



Your local Acme Idea Man is a trained source of packaging ideas that can benefit you.

It's easy to operate the F-1 machine . . . operators require only nominal instruction and maintain high output levels because of less fatigue. The F-1 is electrically powered and can be made fully automatic. It is controlled with fingertip ease to automatically tension and cut steel strapping with no waste. Ends are permanently joined by two instantly applied spot welds . . . and the package is ready for shipping.

**\*Line Up Your Acme Idea Man Today.** Whoever he may be, your Acme Idea Man is ready to prove how the F-1 Machine or any of the Acme Steel Idea products can bring you new high standards of packaging speed, efficiency and economy. For his name, write to Dept. MGS-37, Acme Steel Products Division, Acme Steel Company, Chicago 27, Illinois. In Canada, Acme Steel Company of Canada, Ltd., 743 Warden Avenue, Toronto 13, Ontario.

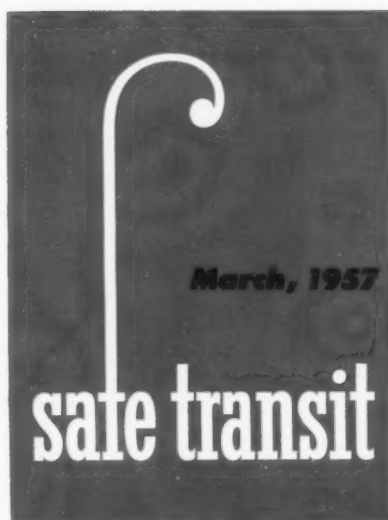


**STEEL STRAPPING**









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York Street at Park Avenue  
Elmhurst, Illinois

### editorial voice of the national safe transit program

devoted to improving packaging methods and shipping and materials handling methods for the appliance and metal products manufacturing industries. This section contains plant experience information and industry advances for the use of all executives and plant men interested in improving packaging and shipping methods and in loss prevention. The section contains complete information on the national safe transit pre-shipment testing program for packaged finished products and detailed reports of divisions and sub-committees of the National Safe Transit Committee.

## Proposal for standard pallet sizes

**R**EDUCTION of pallet sizes from the hundreds now in general use to 10 standard sizes is suggested in a tentative draft for "Proposed American Standard Pallet Sizes" by a committee of widely known industrial and materials handling specialists. The tentative draft resulted from their prolonged study of pallets as related to transportation facilities, mechanical materials handling equipment, requirements of in-plant materials handling, and other factors.

The study was co-sponsored by the Society of Industrial Packaging and Materials Handling Engineers and the American Society of Mechanical Engineers in accordance with procedures of the American Standards Association.

F. H. Wiley, supervisor of materials handling research for International Harvester Co., Chicago, is chairman of the main A.S.A. B-69 sectional committee that was organized to study standardization of pallet sizes. J. E. Wiltrakis, assistant supervisor, Western Electric Co., Kearney, N. J., is chairman of the technical committee under whose jurisdiction the tentative draft was compiled and formally printed.

Greater utilization of trailer truck and rail car area and cube was one of the principal objectives in the study. The ten suggested sizes of pallets are believed by the specialists to make maximum use of shipping space and at the same time simplify materials handling

in warehouses, industrial plants, and elsewhere. Single copies of the formally printed "tentative draft" are available

through the Society of Industrial Packaging and Material Handling Engineers, 111 W. Jackson Blvd., Chicago 4, Ill.

### MATERIALS HANDLING SHOW IN PHILADELPHIA APRIL 29 — MAY 3

With about 250 companies expected to use over 100,000 square feet of exhibit space, the 7th National Materials Handling Exposition, to be held at Convention Hall, Philadelphia, April 29 through May 3, is expected to exceed its predecessor by more than 15 per cent in size.

The show will emphasize systems of materials handling rather than any particular piece of equipment. Over 100 types of equipment will be demonstrated. Theme for the 1957 show will be "Materials Handling, Key to Automation."

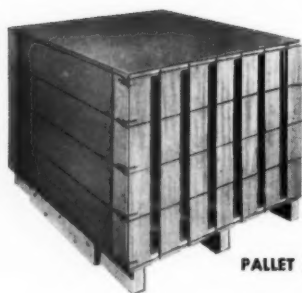
Thirty-two speakers will address a conference conducted by the American Material Handling Society, April 30-May 2. On May 1, the society will hold its annual banquet at the Bellevue-Stratford Hotel, where annual awards and honors will be presented. The conference, too, will stress systems and is expected to break all previous records for attendance.

### PACKAGING INSTITUTE PLANS NINETEENTH ANNUAL FORUM

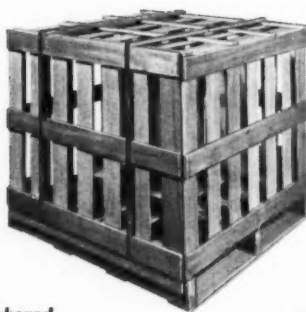
N. W. Postweiler, Riegel Paper Corp., Chairman 19th Annual Forum Plans Committee held the first meeting of his all-industry group on January 15th at the Columbia University Club in New York City. Basic plans for the 19th Annual Forum were discussed and it was established that the forum will be held at the Hotel Statler, New York City, October 28-30, 1957.

### NST PRESENTATION RESULTS IN ANOTHER CERTIFICATION

An NST presentation was recently given top management of the Westinghouse Micarta Plant in Hampton, S. C. The following day a certified testing laboratory tested and approved their packaged product. As a result an application for certification was signed and sent, along with an order for 5,000 NST labels, to NST headquarters immediately.



PALLET BOXES — Wirebound

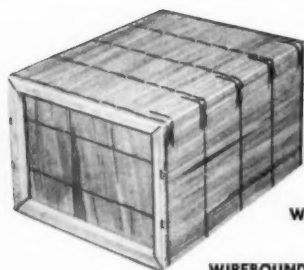


PALLET BOXES — Hinged Corner



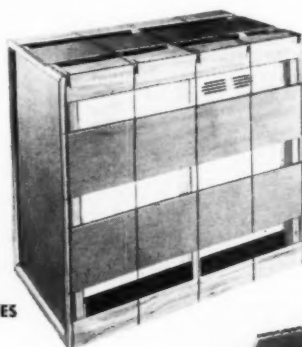
CLEATED BOXES

*We make 'em all*



WIREBOUND CRATES

WIREBOUND BOXES



E-Z PAK CLEATED CORRUGATED  
(Watkins Type)



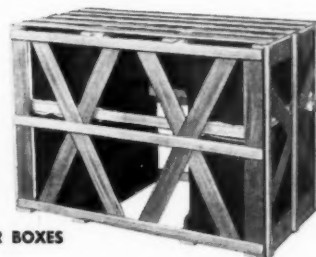
CORRUGATED

*you can be sure . . . .*

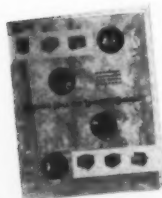
that recommendations from Chicago Mill are based on impartial, unbiased decisions because we manufacture the most diversified line of shipping containers in the country!

*Materials used include—*

Plywood • Craveneer • Corrugated • Veneer • Resawed



HINGED CORNER CRATES OR BOXES



**FREE!**

*Illustrated catalog showing the various types and applications of Chicago Mill containers, Chicago Mill's services.*

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- GREENVILLE, MISSISSIPPI
- HELENA, ARKANSAS
- ROCKMART, GEORGIA
- TALLULAH, LOUISIANA



## ANOTHER TESTIMONIAL FOR NST

J. K. ADAMS, manager of manufacturing, Wiring Device Division, The Bryant Electric Company has this to say about Safe Transit Testing: "I thought you would be interested in knowing of the benefits the Bryant Electric Company has found since the installation of our "Safe Transit" testing equipment.

We had experienced serious difficulties in shipping "Shur-Temp" units from Bridgeport to Mansfield and had changed packing methods several times without improving the results. When we were able to pretest our packaging, we found the weak points without waiting for field experience.

Our engineering dept. has also been very enthusiastic about the use of this equipment as they can make the test on models while still in the development stage. This has saved us both time and money as changes in both tools and dies can be made before field trouble occurs.

We are also using our equipment to test shipping cartons and packing procedure for our Plastic Dept. Prior to "Safe Transit Testing", cartons were

pushed down a flight of steps and carton design was left to the salesmen. We now test all sample cartons before approving for stock. We feel that the use of "Safe Transit Testing" will improve our customer relations as merchandise damaged and distorted in transit is of little value to a customer.

## KIECKHEFER OPENS NEW PLANT AT WILD ROSE, WISCONSIN

The Kieckhefer Box & Lumber Company, manufacturers of wooden boxes, crates, wood cleated corrugated shipping containers, and pallets, recently announced the start of operations at a new manufacturing plant at Wild Rose, Wisconsin.

William J. Kieckhefer, company president, stated that the new plant is expected to be in full operation soon with employment in excess of 100 people. The service yards of the new plant will carry an inventory of 3 million board feet of lumber.

The Kieckhefer Company has been in continuous operation since 1900, with plant and offices in Milwaukee, Wisconsin. According to the report, the general sales office will continue to be main-

tained in Milwaukee, and customer service will be maintained at the Milwaukee address — 1711 West Canal Street, Milwaukee 3, Wisconsin.

W. O. Gilker is superintendent of the new Wild Rose operation.

## BRAINARD DIVISION CREATES NEW RESEARCH AND DEVELOPMENT LABORATORY FOR STRAPPING

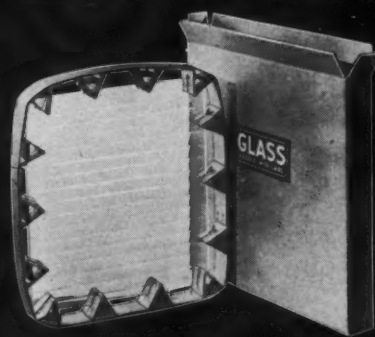
Plans for a new and greatly expanded program of product research and tool development for the entire strapping industry were announced today by E. T. Sproull, general manager of the Brainard Division of the Sharon Steel Corporation.

Mr. Sproull said, "When our new Product Research Development Laboratory opens next month, we will be able to offer the most complete and up-to-date service to users of strapping. We are aware that for customers to best use strapping they must have the most modern tools and accessories. With our new lab, we will concentrate on tool development and at the same time increase our engineering services and product development."

"All manufacturing, engineering, and quality efforts are in vain if the product reaches its destination in a damaged condition."

National Safe Transit Committee  
Reprinted by  
GM Service Parts Packaging Committee

## IN-CARTON *suspension* reduces glass breakage



Vertical-Horizontal suspension safeguards your product in and out of carton . . . Fewer packaging components required . . . pad folding eliminated.

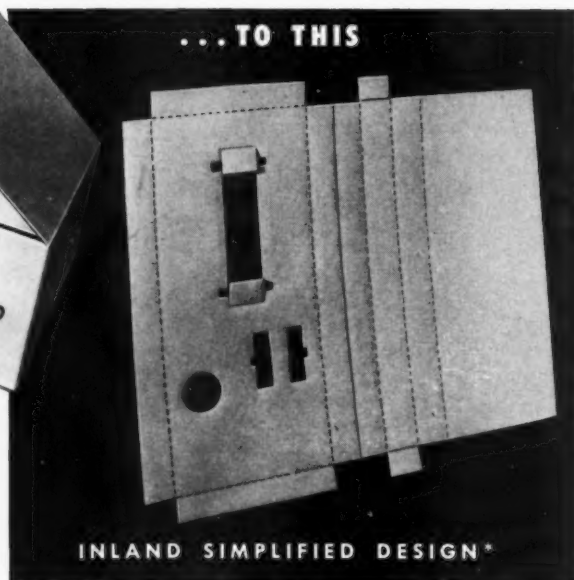
SUS-RAP is engineered to your product and pretested by N.S.T. procedures

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# HOW *Inland* DESIGN LEADERSHIP SAVES YOU MONEY



## \*Result: 30% Reduction in Packaging Labor Cost for this Inland Customer

● This two-piece inner packing, with its complicated tabs and folds, required too much costly assembly time. That's the problem Inland package engineers solved with their new, one-piece design . . . cut packaging labor cost 30% and, at the same time, provided complete protection for the products of this well-known pump manufacturer. (Name on request.)

Your Inland package engineer is a *corrugated shipping container specialist*. When your product packaging is entrusted to him, you can be sure you are getting the benefit of every possible packaging economy applicable to your product.

### *Inland Boxes Build Good Will*

Send for this booklet fully illustrating Inland's services, facilities and products.



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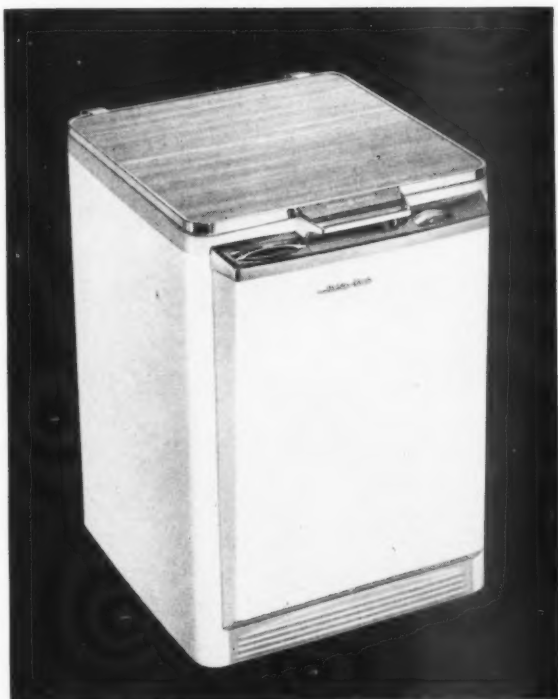


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*Corrugated Fiber Boxes*

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## **Packaging the** **"mobile maid"** **dishwasher** **at G E appliance park**

**pre-shipment testing, an efficient packaging line, modern strapping stations, and fingerlift trucks combine to save space and overall packaging cost**

**T**HE combination of a sturdy corrugated container and an efficient packaging line has developed impressive savings in packing time and container storage space, and has reduced the overall cost of packaging the 1957 "Mobile Maid" automatic dishwasher line for General Electric Company.

The Dishwasher and Disposall Department of General Electric Company is a part of the spacious Appliance Park installation at Louisville, Kentucky.

GE engineers have developed a new automatic dishwasher that embodies many new features such as power pre-rinses, "Flushaway drain", complete mobility, simplified installation and a gleaming exterior that can enhance even the most modern and attractive kitchen. Their work completed, the sales and merchandising departments of the company set to work to sell and promote the new line in today's highly competitive market. Meanwhile, behind the scenes, another group of experts, sometimes overlooked in today's merchandising pace, concerned themselves with the problems of producing, packaging and delivering this attractive appliance to distributors and consumers all over the country. In this critical stage lies a real merchandising test — how will the product look and function when delivered to the ultimate

---

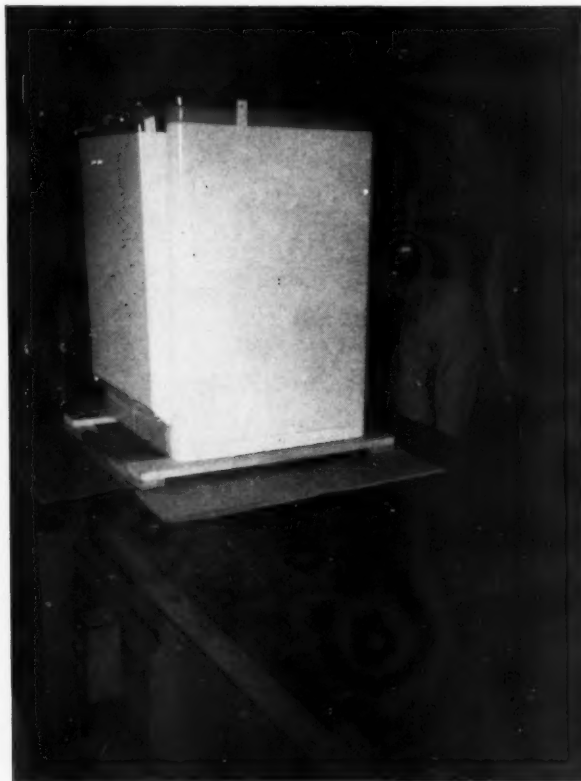
***PACKAGED DISHWASHERS** stacked in warehouse ready for carloading and shipment.*







*WOOD BASES are bolted to the dishwasher as the packaging line operation begins for the dishwashers.*



*BOTTOM CAP of the corrugated container is now under the upright dishwasher on the conveyor line.*

user? The package used has been pre-shipment tested and proved to assure the safe arrival of the merchandise.

The 1957 Mobile Maid is delivered in a tube and cap design corrugated carton made of 275 pound test board with four scored corner posts. These 200 pound test corner pads are waxed so that their surfaces cannot have an abrasive action on the dishwasher surface. The top and bottom caps are strapped solidly in a mechanical opera-

tion built into the packaging line.

A wooden base is a functional part of the container and provides a platform that enables the dishwasher to be conveyORIZED in the packaging line.

GE packaging engineers, Patrick McDonald, Al Williams and automatic strapping station designers from the container supplier worked closely with buyer, Jim Mapother and Joe Achino of Methods and Time Standard Dept. in developing and testing the new container.

In packaging operations the wood base is bolted onto the base of the dishwasher which then moves down the conveyor line where the wood base slides onto the bottom cap. Pre-assembled corner pads are set into position and the tube slipped over them.

Tubes also are pre-assembled by mechanically strapping the top cap onto the tube. The bottom cap is closed by mechanical strapping equipment stationed at the end of the line and the

*TOP CAPS are automatically strapped onto the tube at strapping station shown in this photo.*

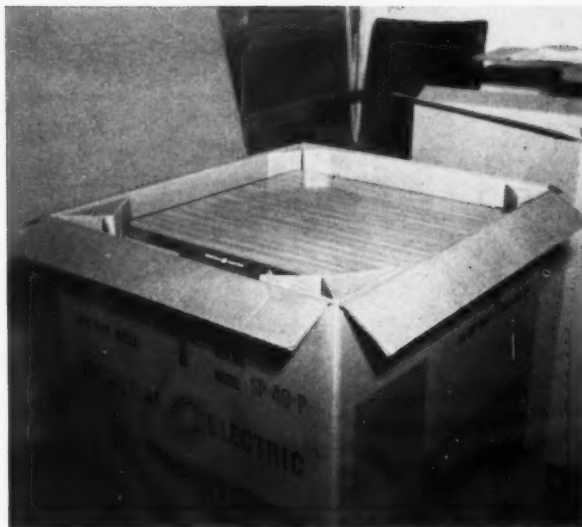


*BOTTOM CAPS are automatically strapped to complete the packaging operation for shipment.*





*PRE-ASSEMBLED corner pads are set in place and the container tube placed over them.*



*PROTECTION from blows is illustrated in this closeup photo showing how corner pads "float" dishwasher.*

PHOTOGRAPHS COURTESY GENERAL BOX COMPANY

*CARLOADING is illustrated in this photo which shows three-high stacking. Handling is by fingerlift trucks.*

completely packed units move on into the warehouse area. Here fingerlift trucks handle four dishwashers at a time to stack them eight high in storage or to load them directly into freight cars for shipment.

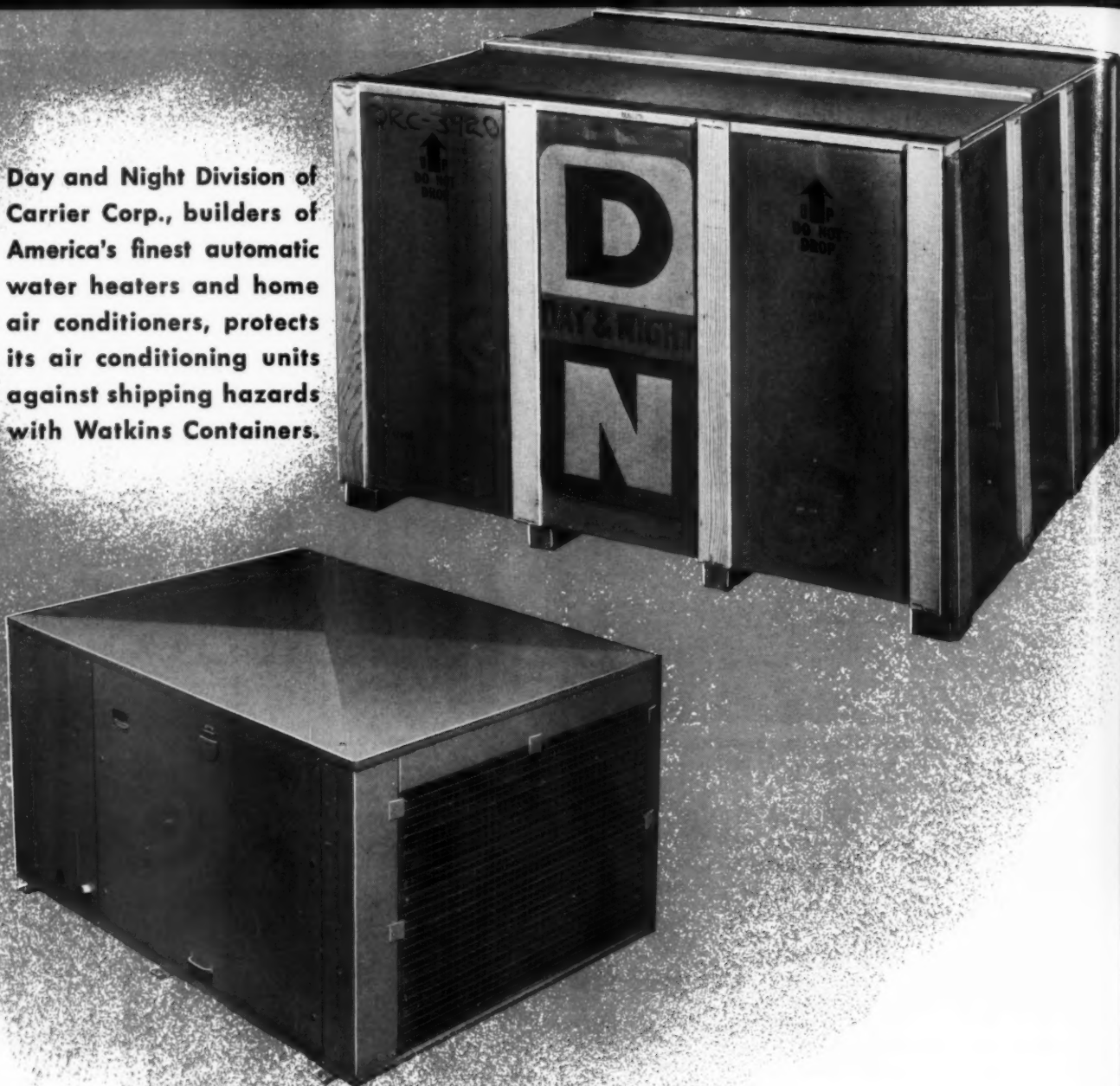
Each loaded container weighs 120 pounds and they are distinctively printed on all four sides of the container. Unpacking instructions are printed right on the top cap as a dealer aid.

The General Electric Mobile Maid Shipping and Warehouse Departments find that the mechanized packaging operation saves them both time and money. The flat containers require a minimum of storage space which is important due to the restricted area available.

Standardization of the container and packaging operation enables the container supplier to correlate production with GE's schedule. As a result, no large stocks are necessary, and the supplier delivers containers according to the schedule needs. That the carefully engineered package, combined with the packaging line described, offers adequate product protection is attested by an envious record of little or no damage in shipping reported by GE. Solid, safe stacking in warehouses and facilities for fingerlift handling of multiple loads have also proved advantageous.



Day and Night Division of Carrier Corp., builders of America's finest automatic water heaters and home air conditioners, protects its air conditioning units against shipping hazards with Watkins Containers.



## The Finest Products Go In Watkins Containers

They are preferred because of:

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|----------------------------------|--------------------------|
| 1. Low Cost                      | 4. Ease of Assembly      |
| 2. Stacking Strength             | 5. Easy Handling         |
| 3. 75% Assembled—Upon Receipt    | 6. Minimum Storage Space |
| 7. Protection from Dust and Dirt |                          |

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*Custom Protection . . .*

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UTILITY CRATE CORPORATION  
2019 Imperial St., Los Angeles 21, Calif.

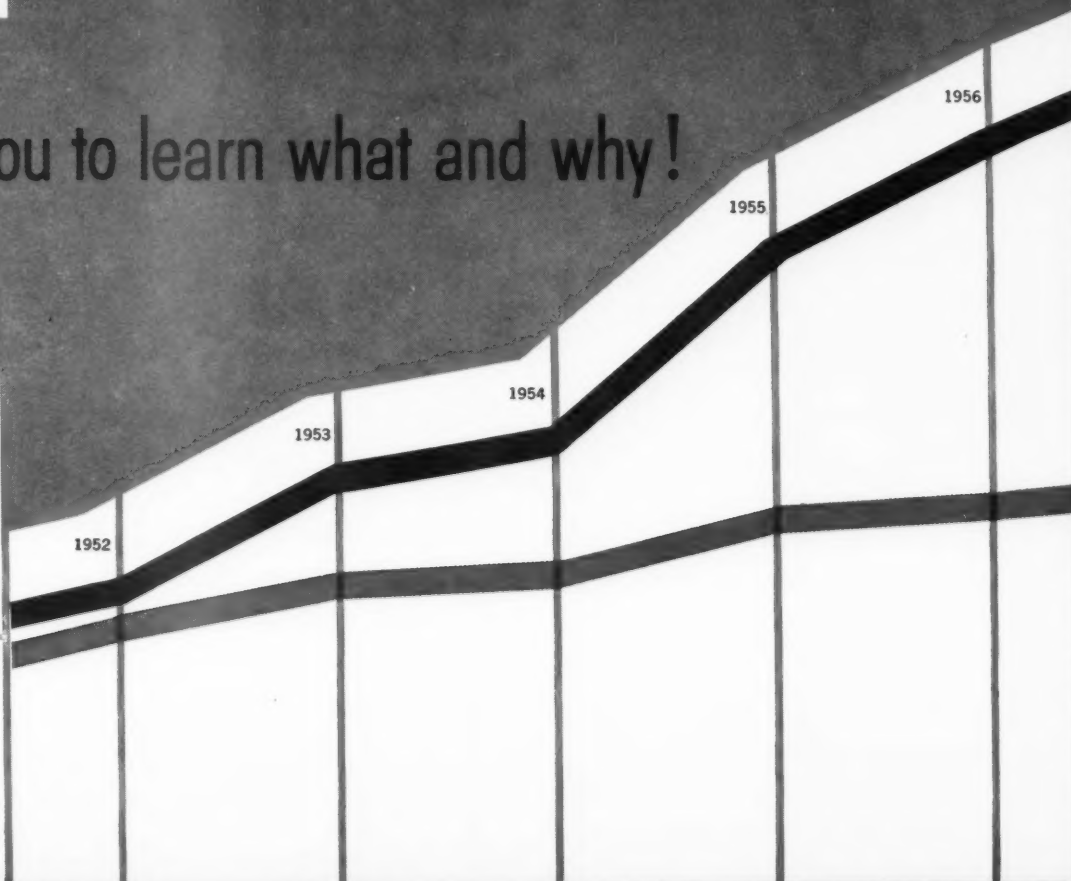


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**"I saw your ad in MPM"**

## Editor's mail

→ from Page 29

like to have his name on your mailing list and he quickly replied, "I certainly would!" His home address is as follows: C. E. Meyer, Vice President, Barrows Porcelain Enamel Corp., 3623 Woodford Road, Cincinnati 13, Ohio. I will appreciate your passing this information on to your circulation department.

Ruth I. Steilberger  
Director of Purchases  
Barrows Porcelain Enamel Corp.  
Cincinnati 13, Ohio

Ed. Note: We will be pleased to see that Mr. Meyer's name is added to our mailing list so that he receives our publication at his home address.

## Plastics

→ from Page 85

were epoxies, 500,000 lbs. low pressure phenolic and the remaining 500,000 lbs. divided among such plastic resins as silicones, polystyrene, melamine and vinyl.

### The complete end use picture for reinforced plastics:

Aircraft .....	20%
Construction (including plain and corrugated sheeting) .....	16%
Boats (both all reinforced and used as outer skin on wooden hulls, and accessories) .....	16%
Consumer Products (such as fishing rods, luggage, sleds) .....	10%
Automotive (excluding premix) .....	8%
Containers, trays, tanks .....	5%
Appliances (laundry tubs, air conditioner housings, refrigerator liners, water softener housings, etc.) .....	5%
Miscellaneous (half of this total is premix or molding compounds) .....	20%
	100%

This is the first industry report on poundage of reinforced plastics.)

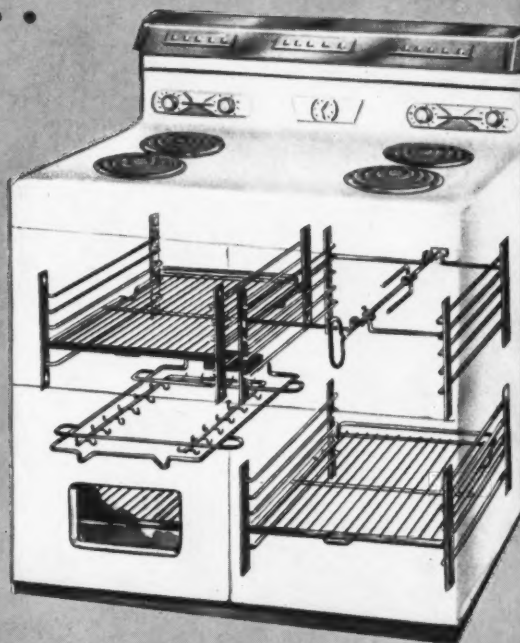
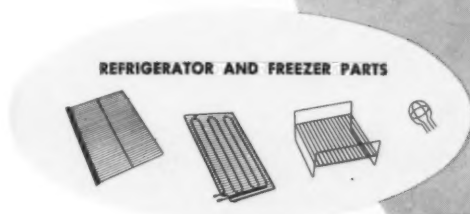
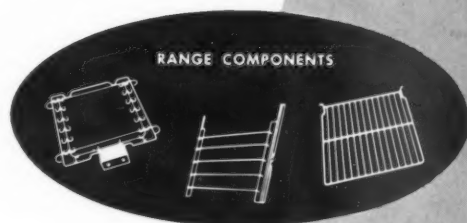
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## USP Wire Components . . .



**FOR MORE  
SALES APPEAL AND QUALITY**

**FOR MORE  
PRODUCTION ECONOMY**

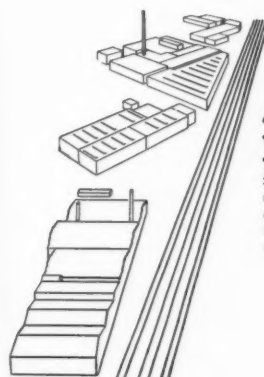
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**4 BIG PLANTS  
To Serve You Better**  
To guarantee you faster, more complete service, the facilities and experienced personnel of all USP plants are at your disposal.

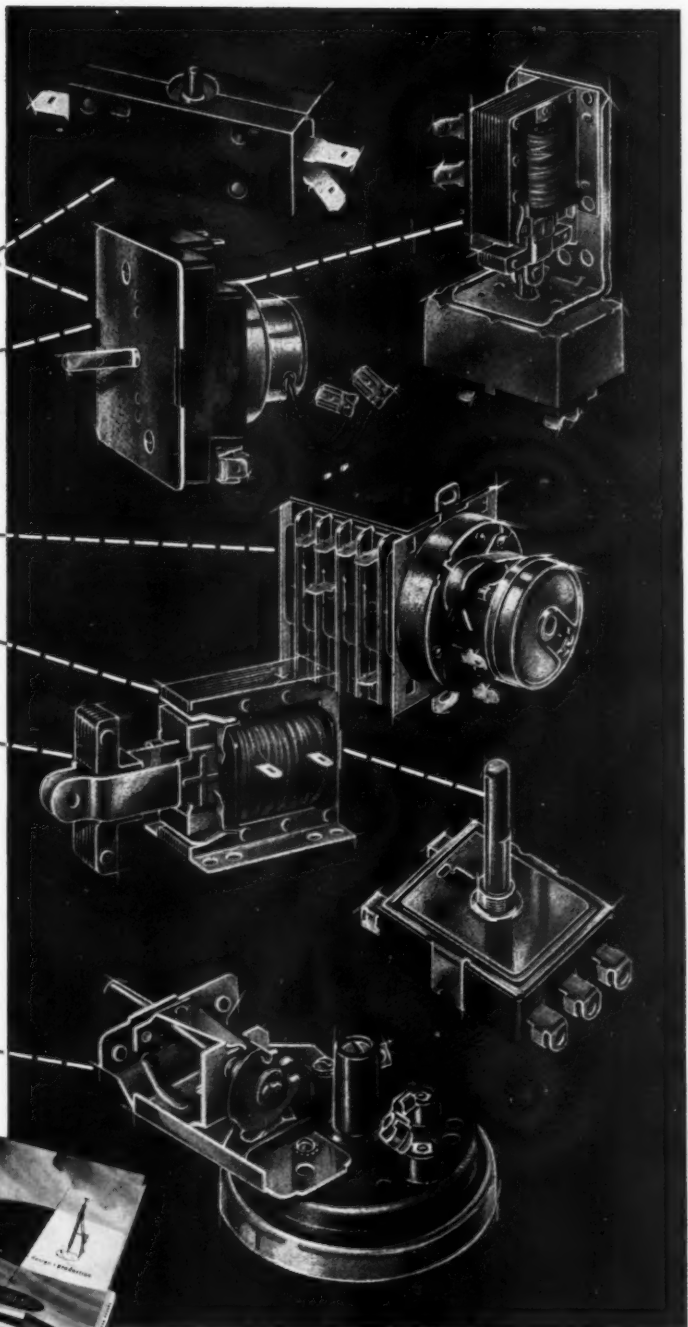
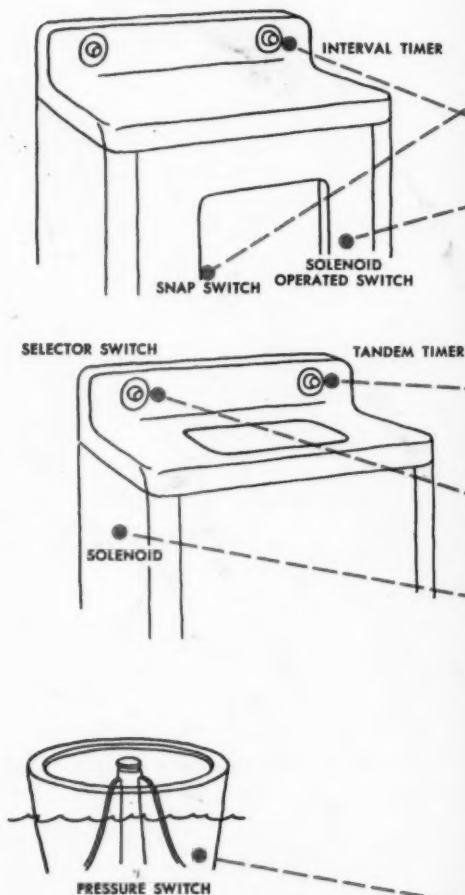
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